

# RAILROAD GAZETTE

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## EDITORIAL ANNOUNCEMENTS.

**THE BRITISH AND EASTERN CONTINENTS**  
edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Railway Gazette.  
**CONTRIBUTIONS.**—Subscribers and others will materially assist in making our news accurate and complete if they will send early information

of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

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## CONTENTS

### EDITORIAL:

Manhattan Elevated—New Stopping Order	285
Chicago Track Elevation	285
"The Law is Good, if a Man Use It Lawfully."	286
Forms of Signals	287
New York, New Haven & Hartford	288
Atchison, Topeka & Santa Fe	289
Trade Catalogues	290

### ILLUSTRATED:

New Freight Terminals, C., N. O. & T. P., Cincinnati	293
A New Four-Wheeled Passenger Truck	297
Union Highway Crossing Bell	298
Robert Water-Tube Locomotive Boiler	299

Time-Freight on the Southern Railway	300
Chicago Track Elevation	302
Pennsylvania Railroad Baggage Checks	303
Reinforced Concrete Trestle for the Illinois Central	304
Use of Superheaters on Belgian State Rys.	305
The Making and Repairing of Locomotive Frames	306
CONTRIBUTIONS:	
"The Division Engineer in Railroad Work"	291
The Railroad Systematizer	291
MISCELLANEOUS:	
Fines for Soliciting Rebates	296
Criminal Prosecution of Prussian Trainmen. (Note.)	300

Alternating-Current Electric Locomotives	301
The Date Principle and Rule 4B	302
Hydrostatic Tests of Locomotive Boilers	304
Tunnels Under the Hudson	305
The Efficiency of Large Gas Engines	306
Early Railroad Construction in New South Wales	307
GENERAL NEWS SECTION:	
Notes	94
Meetings and Announcements	101
Elections and Appointments	101
Locomotive Building	101
Car Building	101
Bridge Building	101
Railroad Construction	102
Railroad Corporation News	104

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FRIDAY, SEPTEMBER 29, 1905.

The principal recommendation of the New York State Railroad Commissioners in their report on the Fifty-third street derailment on the Manhattan Elevated is that all trains shall stop before passing the switch leading to the curve; both those that are to run through the curve and those that are to continue on the straight line. For those that are to take the curve the delay of a stop may not be very serious, as the speed must be reduced to 8 miles an hour anyway; and the grade descends southward so that the heaviest trains can be started easily. But why stop the Ninth avenue trains? What is it that has carried trains past this junction on the straight line safely, hundreds of them daily, for the past quarter of a century? Wherein does the Fifty-third street situation differ from that at innumerable facing-point switches all over the country, past which many trains are running every day at high speed? If enginemen cannot be depended on to look for each signal in due season on approaching it, and to heed its indication, how can we justify more than 15 miles an hour anywhere? It goes without saying, almost, that on a road of heavy traffic the signals should be large enough; be well placed for the engineman to see them, and, if disks, have a good background, like the "banjo" automatic block signals. The signals at Fifty-third street are switch lamps. The "disk" is the side of the lamp, somewhat enlarged, with no artificial background. If anyone should assert that a full-size semaphore, at proper height and distance, would have arrested this heedless motorman's attention, and have prevented the disaster, what answer can be made to him? The commissioners recommend the installation of semaphores. It also goes without saying that the interlocking should be complete. But with suitable signals and, of course, the best brake power, kept in the best condition, so that the engineman knows how and to what extent he can respond to a signal indication, we must depend on the man, or else give up trying to carry passengers at speed. If the rule to regularly stop is the true preventive of this kind of disaster, why should not the same remedy be applied at Mentor, or at every sharp curve approaching a high bridge? In short, the New York Railroad Commissioners have raised a question, which they have not answered, as to the adequacy

of the discipline of locomotive runners in general, and of Manhattan Railway motormen in particular. There is a severe temptation to railroad officers and investigating commissioners to order radical changes immediately after a fatal accident. If the accident is non-fatal there is less of this sort of tendency, although the need of better methods be quite as obvious. In this case we are inclined to say the remedy is bad. It is costly, for the many daily stops cost the company something like 20 cents each for a few hundred trains, and the loss of time to millions of passengers can be computed any way you like. Good discipline everywhere and good signals are better preventives of accidents than local rules imposed by investigators in a hysterical atmosphere.

The figures on the Chicago track elevation work given elsewhere convey some idea of the stupendous task set the railroads by the city. It has been in progress now since 1892, the first piece of work being done by the Illinois Central in anticipation of the World's Fair in 1893. The expenditure to date by the roads amounts to \$29,000,000, in round numbers, according to the estimated approximate cost of the city's track elevation expert. His figures are too high without doubt, possibly as much as 15 or 20 per cent., though of this we cannot be sure. The city has passed and the roads have accepted in the period mentioned 26 ordinances calling for approximately \$49,000,000 worth of work. It is estimated that the total cost of the work when ordinances now contemplated have been passed and complied with will be nearer \$75,000,000, and that all of the work will have been completed before 1915. The yearly expenditure for all roads so far has averaged under two and a quarter millions. The burden of cost is thus distributed over a period of years that makes it much less onerous. It should be known that the entire cost of the work is borne by the roads, the city contributing no part. The total expense sustained by the latter up to the present time it is claimed will not exceed \$35,000. Accepting this figure as correct, the Chicago achievement is remarkable, especially when viewed in the light of conditions in some of the eastern states—New York and Massachusetts, for ex-

ample—where half the cost may, by state law, be borne by the municipality.

What the yearly saving to the roads will be from the elevation of the track is speculative. The elimination of the grade crossings does away with many watchmen and gates, but this will be more than offset by the cost of maintenance of subway bridges, interest on investment, etc. The largest items of saving are in damages due to crossing accidents and loss of life, and of avoidance of numerous and costly delays to traffic. The general ordinance providing for comprehensive elevation of the tracks, known as the O'Neill ordinance, was passed Feb. 23, 1893. It has been made a part of the city's municipal code and has been used ever since as a means to compel the roads to accept the special ordinances that have been passed. There were in 1892 about 1,500 grade crossings in the city which were daily crossed 1,000,000 times by persons on foot or in vehicles, this figure including passengers in trains. Statistics collected at the time were made the basis of an estimate showing the yearly loss to the citizens due to these crossings to aggregate \$5,000,000. This took no account of the losses to the railroads. The yearly loss of life was 300 persons, and a much greater number were maimed and injured, while considerable property was destroyed.

Many new methods and original schemes have been applied in executing this work in order to accomplish it expeditiously and at the same time keep traffic moving with minimum delay. To attempt an enumeration of these would mean simply to give a detailed history of all of the work, as every case has its special and peculiar problems to be solved. In several instances additional difficulties were, or will be, entailed by the necessity for elevating entire yards. Also, many of the rights-of-way are only 66 ft. wide, making it very difficult to do the elevation work and keep traffic moving simultaneously. In general features the work is all quite similar. The retaining walls and bridge abutments are for the most part of concrete masonry, though there are a few exceptions where rubble masonry or dimension stone are used. The Chicago & North-Western builds nearly all of its walls and abutments of large dimension stone. The filling material has been almost entirely sand, the average cost of which has been about 26 cents a yard. The work has resulted in the production of a variety of designs of ballasted floor bridges. At the outset these were exceptional, but there were so many objections to the shallow-floor designs as to lead to their abolition and the substitution of ballasted designs. This presented new problems in water-proofing and steel preservation which have not yet been satisfactorily solved.

Track elevation work has been done in several other large cities, while a great deal more is under way or contemplated, but the Chicago situation is unique both as to conditions and magnitude. No other place in the world has such a complicated track and terminal system, or so many streets with heavy traffic crossed by lines of railroad. In the manner of solving the general problem and the multitude of individual problems will therefore be found examples for guidance under any conditions which are likely to arise in any American city for some time to come.

#### "THE LAW IS GOOD, IF A MAN USE IT LAWFULLY."

[I. Timothy, 1:8.]

"In fixing the rate on dressed meat we do not have very much to say. The packer generally makes the rate. He comes to you and always makes you feel that he is your friend. Then he asks you how much you charge for certain shipments of dressed meats. The published tariff may be 23 cents a hundred, but he will not pay you that. You say to him, 'I'll carry your meat for 18 cents.' He says, 'Oh, no, you won't. I won't pay that.' Then you say, 'Well, what will you pay for it?' He then replies, 'I can get it hauled for 16 cents.' So you haul it for 16 cents a hundred. He generally tells you that if you want the business you must haul the meat for the price he names."—*Testimony of A. B. Stickney, President of the Chicago Great Western, before the Federal Court.*

The Majordomo of the President of the United States communicated by long-distance telephone to a trunk-line president the following information and request: The President, with certain public officers and friends, desires to leave Washington on a date named for a trip through several states and stopping at specified cities. For this purpose he wants a special train and suggests for his own use a certain private car which he has already used and which suits him. He would also like to have a certain porter, name given, who had served him before and whom he liked. A list of special supplies for the dining car, in addition to the ordinary commissary, was also submitted. The railroad president assured the President's representative that a plan would be immediately prepared in full detail and forwarded by mail.

This was done without delay. The special private car asked for was at the time in far distant service and therefore unavailable, but it happened that quite an exact duplicate could be put at the President's disposal. Neither was the particular porter to be had. Circumstances had led to a transfer of his racial volatilities to another sphere of service and entertainment. With these exceptions a schedule was made in full detail, giving arriving and leaving times and complying with all of the President's suggestions.

The last sentence in the communication informed the Majordomo that a nominal charge of \$50 a day would be made for this special train, fully officered and provisioned. It was really a "nominal" charge, being less than cost. Nevertheless it produced an immediate reply and protest—by telephone: There was no authorized appropriation of public funds for such an expenditure, and the President could not possibly afford to pay it from his private purse. Unless the service could be furnished gratuitously it would not be acceptable.

Railroad presidents are not hard bargainers with powerful rulers, and in this case the reply was cordial and reassuring—no charge would be made for the service. But the itinerary covered many hundreds of miles of travel on other roads, and the officers of these other roads, not dealing directly with the Presidential party, found an easily understandable pleasure in sending to the trunk-line president their several bills for hauling the Presidential train over their lines. The bills were paid, but some of the letters accompanying them were unanswered. One officer quoted from the Interstate Commerce Act of 1887, Section 1, as follows: "All charges made for any service rendered or to be rendered in the transportation of passengers or property . . . shall be reasonable and just." This was in explanation of his charge of 15 regular fares for the hauling of each car. Another apologized for sending a bill, but expressed a fear of the penalty (conviction of misdemeanor, \$5,000 fine and two years in the penitentiary) for violating Section 2 of the Interstate Commerce Act, which reads as follows:

"That if any common carrier subject to the provisions of this act shall, directly or indirectly, by any special rate, rebate, drawback, or other device, charge, demand, collect or receive from any person or persons a greater or less compensation for any service rendered, or to be rendered, in the transportation of passengers or property, subject to the provisions of this act, than it charges, demands, collects, or receives from any other person or persons for doing for him or them a like and contemporaneous service in the transportation of a like kind of traffic under substantially similar circumstances and conditions, such common carrier shall be deemed guilty of unjust discrimination, which is hereby prohibited and declared to be unlawful."

It is not suggested that the President, in demanding free transportation, is as guilty as the packers who force a rebate, for custom has much to do with nice questions of morality. It is, too, supposable that the President in taking his oath of office was more impressed by his undertaking to enforce the law than to obey it.

When the trunk-line president paid these bills, his railroad conscience was quieted by this much: He had not successfully induced other railroad presidents to commit a statutory crime and it seemed improbable that the President would instruct the Attorney-General to prosecute him for his crime. Nevertheless he had been "Godlike in giving, but the devil to pay," for in the course of the tour, for which he was paying, the President addressed a convention of the Brotherhood of Locomotive Firemen, and ostentatiously accepted membership in that organization, one of whose main purposes is to monopolize and restrict the business of locomotive firing to its own members. This seemed to be quite as clearly a statutory crime as any one that has been brought before the courts under the Sherman Anti-trust law of 1890. Section 2 reads as follows:

"Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by fine not exceeding five thousand dollars, or by imprisonment not exceeding one year, or by both said punishments, in the discretion of the court."

It is not suggested that the President has made himself liable to a fine of \$5,000 and imprisonment for one year by accepting membership in an organization whose undertaking is to violate the law and possibly incur such penalty. He likes firemen, and in this we join. He approves, as we also do, of the basic principle that they should organize, and of many of their purposes. Perhaps, too, with genial catholicity, he may paraphrase an utterance of the statesman, Tim Campbell: "Phwat's a little matter like statutory crime between frinds?"

The President's speeches have benefited his countrymen, have done good in the world, by substituting higher ideals of morality,

and observance of the spirit of the law, for the strict limitations of the law. He has, verbally, expanded and made practical application of Mr. Cleveland's theory of a public trust; but for the purpose of making these speeches he has compelled common carriers to carry him free, to be guilty of "unjust discrimination, which is hereby prohibited and declared to be unlawful." He has successfully prosecuted the Northern Securities Company for attempting "to monopolize any part of the trade or commerce among the several states" (a fulfillment of the law, but probably an economic error) while at the same time holding honorary membership in an organization violating the same law for a bad purpose.

Discrimination, charging one more or less than another for like service, is odious; un-American, if you please, for it does not give all an equal chance. Railroad officers do not like to discriminate, but there are more than a thousand railroad operating companies, and in that number one or more can easily be found weak enough, or so sorely pressed, as to make direct or indirect rebates, and, as rates are minutely interdependent, this is liable to tear the structure in pieces. Officers of roads losing business as a consequence of other's rebates have then for instant decision an old moral question: "Shall I obey the law and violate the trust given to me by my stockholders; or shall I fulfill the trust and break the law?" The unshackled moralist says: "Be good; resign if you cannot keep your trust and be law-abiding." But the Bible says: "The law is good, if a man use it lawfully," and the good railroad president derives a converse from this: He fulfills his trust, lawfully if possible, unlawfully if forced to that alternative by another's lawlessness.

We need, and all worthy railroad officers will welcome for their own protection, a strict enforcement of the law against discrimination and the evil results of monopoly. Example, as well as precept, should come from the highest authority in the land.

#### FORMS OF SIGNALS.

It would seem to be now full time for a summing up of the kinds of information given by signals with a view to standardizing forms for specific purposes. Interlocking, automatic block and telegraphic block signals are in rapidly increasing use, but the same kind of signal which conveys this sign language to the man in charge of a moving train is also used for many other purposes, as we shall see. It does not simplify the work of a mechanic to restrict him to the use of one tool—it complicates it. Somewhat similarly the memory of the engineman is already worked pretty hard in remembering the many meanings of the positions of the semaphore by day and two or three colors at night, and the burden will grow as signal applications increase.

The letter ballot taken by the Railway Signal Association in favor of using the semaphore signal in a way that is new is notable for two reasons; that the vote was 24 to 13 in favor of a radical change; and also the smallness of the vote, which apparently shows that more than 100 practical men are in such open mind, or state of doubt, that they preferred not to vote. Both of these derivatives are distinctly commendable, and suggest that, in view of the fact that railroad signals are now intended to tell so many different kinds of things, some logical variation in their form will soon be quite necessary, or the engineman's memory will be over-taxed.

Enginemen are apt to know much less than is commonly assumed. The specific qualities for which they have every-day use are attention and memory. They memorize the cuts, fills, grades and structures along the line so that they know the road and know where to look for certain signals, of which they have memorized the meaning. With the increasing use of signals of different kinds of meaning the memory is liable to be over-burdened unless it is helped by distinctive forms. This is already partially recognized, and it is worth noting that it is done to a greater extent in England than in the United States, and also that it is rarer there than here for an engineman to over-run his signal. We preach much of discipline. Let us see if in one respect it cannot be bettered by lightening the load on the engineman's memory. This is purely academic, intended to be suggestive of a line of study rather than indicative of a fixed plan.

Signal indications may be enumerated as follows:

First.—Switch signals. This is the primary form of signaling to the engineman that the track ahead is passable either on the main line at high speed or for a turnout at low speed. When the switch is interlocked and we give by concerted movement both

a home and a distant warning of the position of the switch, it is not uncommon practice to have two blades on the home signal post; the upper blade to show that the main line is open or closed and the lower blade to show whether or not the switch is set for a turnout. From the positions of these blades the engineman may know whether or not he can maintain speed for the main line, or must slacken for a turnout. There is occasionally a further complication: A diverging line with a No. 20 frog which can be safely passed at high speed, and a near-by turnout. Here three blades are used; the upper for the main line; the next lower for the diverging line; and the third, a short blade, for the low-speed turnout, so that the engineman may know the route indicated and the speed permissible.

Second.—Drawbridge home and distant signals, interlocked and controlled by the position of the bridge.

Third.—Block signals which indicate that the track for a certain distance ahead is or is not occupied by a train.

Fourth.—Unusual route signals. Scheduled trains have in many terminals or important stations a track and platform from which they regularly start, and a path through the yard which they regularly follow, although, generally, this practice is rather English than American. Similarly, in arriving at such stations they usually follow the same route through the yard and arrive at the same platform. Wrecks, track repairs, trains run in sections in busy times, or like unusual causes often make it necessary for scheduled trains to arrive and depart by unaccustomed routes. In terminals where there are six or more tracks, the cross-over signal blades are sometimes specially marked, so that the incoming engineman may know where he is going, and perhaps further slacken speed. At the Waterloo (London) station of the London & South-western this special marking is a ring, perhaps 15 in. in diameter, affixed to the blade. The starting signals at this station are also specially marked with an X, and the height of this symbol is perhaps twice the width of the blade.

Fifth.—Train-order signals, notices to the engineman to stop for orders, are located at a station or a tower. The order having been received, the same signal is used for a starting indication.

It appears, therefore, that when a railroad is fully signaled there are as many as five different subjects concerning which information is conveyed to the engineman. Multiply by two for two-position signals and again increase for home and distant signals, and we strain the simple language of the semaphore too much. When under such conditions the engineman makes an occasional error in interpreting the language shall we charge it all to lack of discipline. The engineman has his limitations.

Broadly, there are two kinds of information given by signals, and for a consideration of the subject they may be grouped as follows:

First.—Signals indicating the physical condition of the track considered as a structure (switch, drawbridge and interlocking signals).

Second.—Signals directing the train movement or restricting it by reason of occupancy of the track (block, starting, unusual movement and train order signals).

Assuming that the increasing quantity and number of kinds of information given by signals to enginemen makes the language of the semaphore inadequate for quick and absolutely certain reading by quite ordinary human beings under all circumstances, it naturally follows that a form of signaling to indicate the condition of the track and an entirely different form to indicate the occupancy of the track might be a simplification. Indeed, we do not need to make that assumption in order to come to this conclusion. Although it is probably true that there is up to now no railroad in this country fully protected by signals, completely blocked and with all switches interlocked, nevertheless there are plenty of roads where the varied meanings of the same sort of indicator tend to make the memory of the engineman uncertain.

A considerable majority, but by no means all railroad men, have the opinion that a semaphore—a position signal—is a more pronounced and effective indicator than a disk showing color only. Of course at night, with the universal use of single lights, preferences for the semaphore have no significance. On the other hand, there is plenty of support for the opinion that, as compared with the position of the semaphore, the color in the disk can be distinguished nearly or quite as far away—or at least far enough.

The reason for this rehearsal of facts which every signal man knows is to invite not only their attention but also the attention of managers to the situation—the probability that they are buying

and installing material which it may soon be wise to scrap. The over-running of signals is not all due to defective discipline, for, if one kind of signals told only of track conditions and an entirely different kind told of occupancy, the engineman would not need to do so much thinking. His memory would be helped, and this is what we want to help, for it is his main guide.

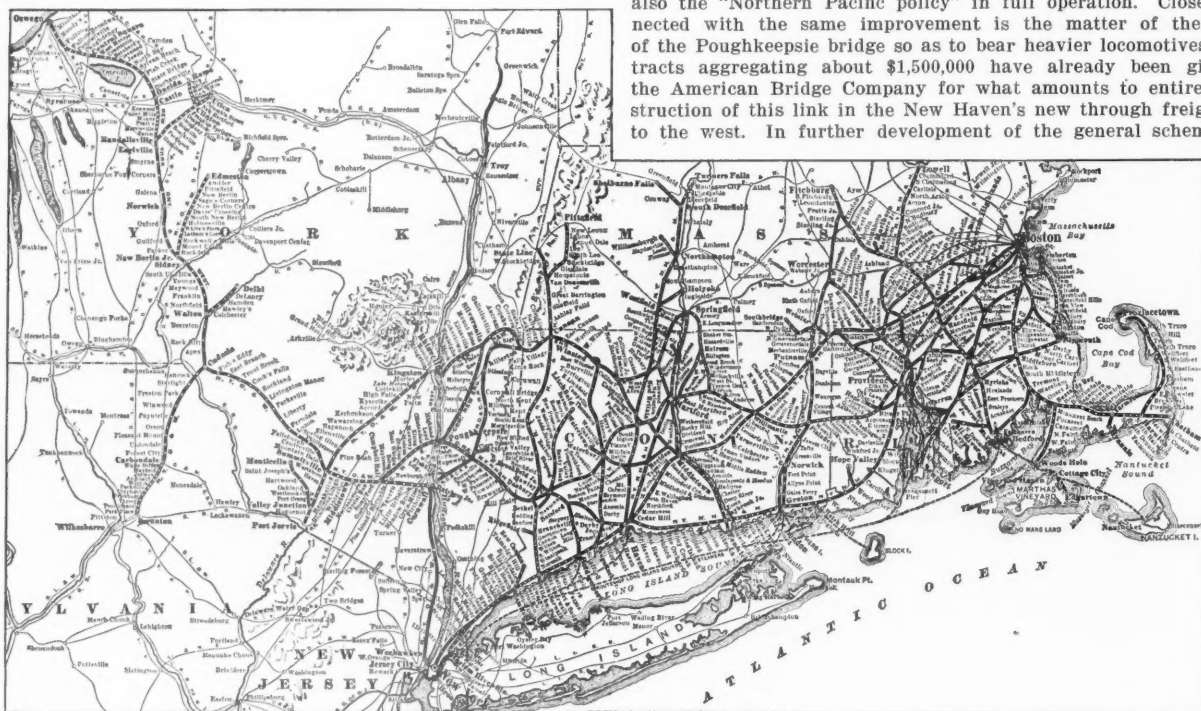
It is not intended to propose the use of semaphore and disk signals to do the two kinds of signaling work. The intention is rather to point out that a broad view should be taken of the whole subject, and that, in this comparatively early stage of the art, a logical orderly working plan will make operation safer and prevent the waste of a lot of material. It is a problem to be worked out.

#### New York, New Haven & Hartford.

Since President Mellen succeeded President John M. Hall as head of the New York, New Haven & Hartford, two years ago, his policy in the development of the property has been one of exceptional import and interest. When he first took office he faced a series of exceedingly grave problems. The rolling stock of the company was in low condition; labor troubles had not been settled; bridges were insufficient to bear heavy locomotives and allow of increased train loads; there were questions in legislation to be

bold Mellen policy. Truly a most remarkable showing and very significant as to the general wisdom of acquisition of rival electric railroads by steam companies. The returns also, we presume, do not include a large part of the earnings of the Hartford, Springfield, Berkshire and smaller trolley systems which were acquired but a few months ago. They would show probably that the present electric system of the New Haven is about the same in financial magnitudes as the New Haven steam system when President Clark took charge of it some twenty years ago. Among the assets of the Consolidated Company there are not mentioned, for obvious reasons, in the report the amazingly liberal and expansive charter granted by the last Connecticut legislature to the holding company. And the same suggestion applies to the general railroad law "repealer" which for the future practically prevents any competing line, steam or electric, from crossing the state bounds.

Next in importance are the indices of the progress of the new President in applying to the New Haven system his old Northern Pacific policy of increasing the train load. Last year there was forecasted in the report the substantial renewal of 107 bridges to standardize the line for heavy traffic. During the year a large part of this work has been done, including several of the large bridges. In fact, by the middle of next year, the reconstruction of the Saybrook-Lyme bridge over the Connecticut river will find the whole of the main stem ready for heavier trains and with the old controversy over the New Haven cut—adjusted since the report was written—settled, a very few months will probably find also the "Northern Pacific policy" in full operation. Closely connected with the same improvement is the matter of the repair of the Poughkeepsie bridge so as to bear heavier locomotives. Contracts aggregating about \$1,500,000 have already been given to the American Bridge Company for what amounts to entire reconstruction of this link in the New Haven's new through freight line to the west. In further development of the general scheme may



New York, New Haven & Hartford.

asked and answered; certain relations with the trunk lines involving freight rates were in a delicate, not to say dangerous case; and, most momentous of all, was the matter of adopting an electric policy and carrying it through to results. In his first annual report a year ago President Mellen, though in terms somewhat vague and general, showed the direction of policies some of which, as they were in transition, had to be partly masked. In his second report, with those policies more developed, he speaks more freely both of past accomplishments and future plans.

Taking up first the things done, there must be mentioned in the primary place the accomplishments in the development of the company's electric policy. The earnings of the great electric "holding" company, the Consolidated Railway Company, for the first time appear. They are \$4,567,978 gross, \$1,682,356 net, and \$431,333 after charges available for dividends. Subtracting the fixed charge of about \$350,000 carried by the debentures by which the trolley system in the city of New Haven was bought, there appears to be a clear profit of about \$81,338—in other words, the great electric system of the corporation with some 560 miles of trackage and representing \$30,000,000 of invested capital in various forms, is already over \$80,000 to the good. But this is by no means all. In the fixed charges of the electric system some \$80,000 of former loss on the Worcester & Connecticut Eastern line is digested. This and other losses allowed for on constituent trolley lines would probably carry the total net result to \$200,000 or more which represents the real net gain for the year to the parent steam corporation of the

year from 1,055 to 1,186; and of passenger cars from 2,050 to 2,090. The decrease in the number of freight cars from 17,128 to 16,862 means presumptively the discarding of outworn rolling stock which larger cars are presently to replace. The expenditure during the year of \$3,564,522 for new equipment is here a suggestive item. So is the laying of 135 miles of new rails. With this rush of improvements, it will not be long before there will be some interesting figures to show the fruits of the increased train load and the decreased ratio of operating expense to business done.

The third subject of importance is the purchase of the New York, Ontario & Western. The net cost of it to the company has been \$13,108,397, interest on which will be for the present just about "washed" by the dividends from the acquired property. What the future holds in the way of increased revenue from this line is an interesting speculation, but with all the guesses favoring the investment, to say nothing of its protective features. As in the new official map printed herewith the Ontario & Western appears as an integral part of the system, the reports current not long ago of a transfer to the New York Central may be definitely rejected.

The more formal figures contain some features of interest. The always striking substantial equation of passenger and freight earnings continues with \$24,146,454 for the former and \$25,341,855 for the latter. Passenger earnings increased over last year \$721,281; freight earnings, \$928,314; rent and telegraph receipts

\$49,442, and total receipts \$1,699,038, which, with an increase of operating expense of \$673,811, leaves an increased income from operation of \$1,025,226. Including gross income from the boat lines, the total gross earnings of the system were \$54,530,696, and, if the income for a full year of the electric holding company as now enlarged is added, the full gross income of the steam corporation must now be considerably above \$60,000,000, placing it high in gross earning power among the great railroad systems of the country. Its extensive improvements and purchases, of course, spell a large increase of debt, suggested particularly by the item "increase of bills payable \$19,600,000" in the summary of financial operations. But the surplus after charges and 8 per cent. dividends was \$308,052. The set policy of the company in buying the securities of leased and controlled lines proceeds, the large sum of \$5,337,678 having been used for that purpose during the year, and eight subsidiary lines have, in consequence, been practically merged. The large profits of the Sound boat lines appear in a surplus over all charges of \$606,831, of which the company has paid itself only \$300,000 in dividends, reserving the balance for surplus account. Hints that must be read large between the lines refer to the diversion of freight traffic from the Harlem terminal to the Poughkeepsie Bridge route, over which much westbound interline freight is now regularly routed. "Other diversions" to come may be interpreted as Mr. Mellen's plan of shifting to the inland routes much of the through freight that now goes by the New York division. This will avoid new tracks on the Shore Line.

The general plan of financing in the future the big projects of the company—involving also the taking up of debts already incurred—is a somewhat new one in the company's history. President Clark's old method of convertible debentures reappears, but with several changes. The debentures—\$30,000,000—are shortened in time to five years, reduced from 4 to 3½ per cent., and, at maturity, are convertible at 150 for 100 in stock instead of on the old 100 for 100 basis. This gives the stockholders a "melon" the size and succulence of which depends ultimately on what New Haven shares are selling for at the end of the five years, though, in the meantime, the melon can be harvested by the sale of rights. It renews the old policy of giving extra dividends to the shareholders in the form of new stock, which was decidedly modified when President Half issued new stock at 175 without the debenture intermediary device.

At several points this adoption of the "melon" policy is to be seriously criticised. It is not very many years ago that the corporation, after following the plan, felt constrained to reduce dividends from 10 to 8 per cent. Improvements call for large and even increasing expenditures for which the great railroad corporations need all the cash they can get. Then, too, there is uncertainty as to the duration of the present period of railroad prosperity and the industrial condition on which it rests. In the case of the New Haven, the argument that valuable distributions to shareholders invite hostile legislation may not apply to Connecticut or Rhode Island but does to Massachusetts. All these reasonings urge that—saying nothing of public interests—the present dividend rate should be conserved for stockholders rather than new dividends made for them by added capitalization. On the other hand may be set Mr. Mellen's pronounced opinion that his system can earn the increased dividend fund required; that his improvements will probably much increase net earning power; and finally—an argument of value in these times—that the plan avoids the bankers, prevents concentration of the stock in fewer hands, and leaves unimpaired that unique strength which the New Haven company has, of control distributed through thousands of old and relatively small stock holdings. Still would it not have been just as effective if the present "melon" had not been quite so big? In immediate and practical aspects the company gets \$30,000,000 for use during five years at 3½ per cent. and the question of earning \$1,600,000 additional net to pay 8 per cent. on \$20,000,000 new stock after conversion, is deferred for half a decade, which may be prolific in unforeseen events.

For the New York, New Haven & Hartford proper, the principal statistics of the last two years' operation follow:

	1905.	1904.
Mileage worked .....	2,088	2,031
Freight earnings .....	\$25,341,855	\$24,413,541
Passenger earnings .....	24,146,454	23,425,193
Gross earnings .....	49,981,948	48,282,909
Maintenance of way and structures ..	5,168,709	5,467,201
Maintenance of equipment .....	5,087,965	4,703,873
Conducting transportation .....	24,287,018	23,911,347
Total expenses .....	35,833,023	35,159,211
Net earnings .....	14,148,924	13,123,698
Gross income .....	51,205,399	49,189,345
Net income .....	6,708,052	6,094,756
Dividends .....	6,400,000	6,400,000
Surplus after dividends .....	308,052	88,308
Passengers carried .....	63,323,475	63,130,459
Tons of freight carried .....	18,321,327	17,560,485
Passengers carried 1 mile .....	1,175,639,000	1,135,702,000
Tons of freight carried 1 mile .....	1,742,915,000	1,661,382,000
Rate per passenger-mile, in cents .....	1.702	1.725
Rate per ton-mile, in cents .....	1.408	1.423
Average freight train load, tons .....	222.85	208.58

#### Atchison, Topeka & Santa Fe.

The last year was a bad one for the Santa Fe on account of the nearly continuous floods which increased the one item, "general repairs of roadway," by over \$1,000,000. Maintenance of way expenses as a whole increased over \$2,000,000, from \$9,170,234 in 1904 to \$11,385,418 in 1905, and from \$1,106 to \$1,371 per mile, an increase of \$265 on each of the 8,305 miles of line. The year was remarkable for excessive rainfall not confined to any one locality, but almost universal and nearly continuous. During the fourteen months ended with the last fiscal year there was hardly a week during which some part of the line could not be operated by reason of floods of greater or less magnitude. On at least three occasions the main lines in Arizona and New Mexico were totally disabled for from four to eight days, besides innumerable smaller breaks. For weeks it was necessary to advise passengers and shippers to make use of other routes. A total length of 9,551 ft. of bridges, 31½ miles of track and 1,000,000 cu. yds. of embankment were carried away, and the stone station building at Trinidad, Colo., demolished. It is impossible to estimate the amount of business lost and its effect on gross earnings. The cost of repairing the damages caused by the floods will amount to \$2,000,000, the greater part of which has been included in the operating expenses of the year. Heavy expense was also incurred in caring for delayed passengers, detouring trains over other lines, overtime paid employees of delayed trains and wrecks due to washouts, so that nearly all the decrease in net earnings as compared with the preceding year may be ascribed to the floods. So far as is possible, steps have been taken to prevent further disaster of this kind. Entire changes of line have been made at several points and protection work built where a change of line was impracticable. Floods of the same magnitude would still work great destruction, but as their severity was unprecedented, a recurrence seems improbable.

These unusual and severe expenses had marked effect on net earnings, which dropped over \$3,000,000 from \$25,949,168 in 1904 to \$22,858,453 in 1905.

Gross earnings (\$68,375,837) in spite of the interruptions and loss of traffic, showed a small increase over the record figure of 1904 (\$68,171,200). Nevertheless, the smallness of the increase is somewhat disappointing, in view of the record of the road since its reorganization in 1895. In the eight fiscal years up to last year the average yearly increase in gross earnings has been \$4,693,746, and in 1903 and 1904, when there were large losses by floods, the gross earnings still steadily increased \$4,500,000 each year. After making liberal allowances for the more general and longer continued ravages of the floods during the past year than in the two years preceding, an increase in gross amounting to less than one-twentieth of the previous eight years' average is less favorable than would naturally be expected, particularly at a time when most railroad companies are reporting large increases. One explanation of the small increase lies in the fact that the grain crops of the year were smaller than usual, the company's share of the grain traffic being less by 685,901 tons, or 30 per cent., than last year. The company also carried 100,000 tons less live stock than in 1904. On the other hand, manufactures and merchandise freight increased by about 170,000 tons—always an assurance of solidity and a traffic which bears a high price.

In every item of maintenance of way and structures, with one very trifling exception, the effects of flood damage are clearly shown. General repairs of roadway increased from \$3,343,428 to \$4,542,037; ballasting, from \$175,348 to \$317,453; renewal of rails, from \$591,259 to \$632,159, and renewal of ties, from \$1,250,977 to \$1,619,186.

Maintenance of equipment expenses were \$10,914,864 for the year, an increase of \$908,729 over 1904. The costs per locomotive and per passenger car, though previously liberal, showed large increases. In 1905 this expense was \$4,165 per locomotive, against \$3,772 in 1904, an increase of nearly \$400 in maintenance expenses on each of the 1,454 locomotives. Maintenance per passenger car cost \$1,152 in 1905, against \$874 in 1904, an increase of \$278 per car. The maintenance cost per freight car in 1905 was \$94 per car, which is practically the same as the 1904 figure. With all the interruption to traffic and additional operating expenses consequent upon such severe floods, the showing made in conducting transportation is highly creditable. This item increased only \$66,900, from \$21,295,960 in 1904 to \$21,362,860 in 1905.

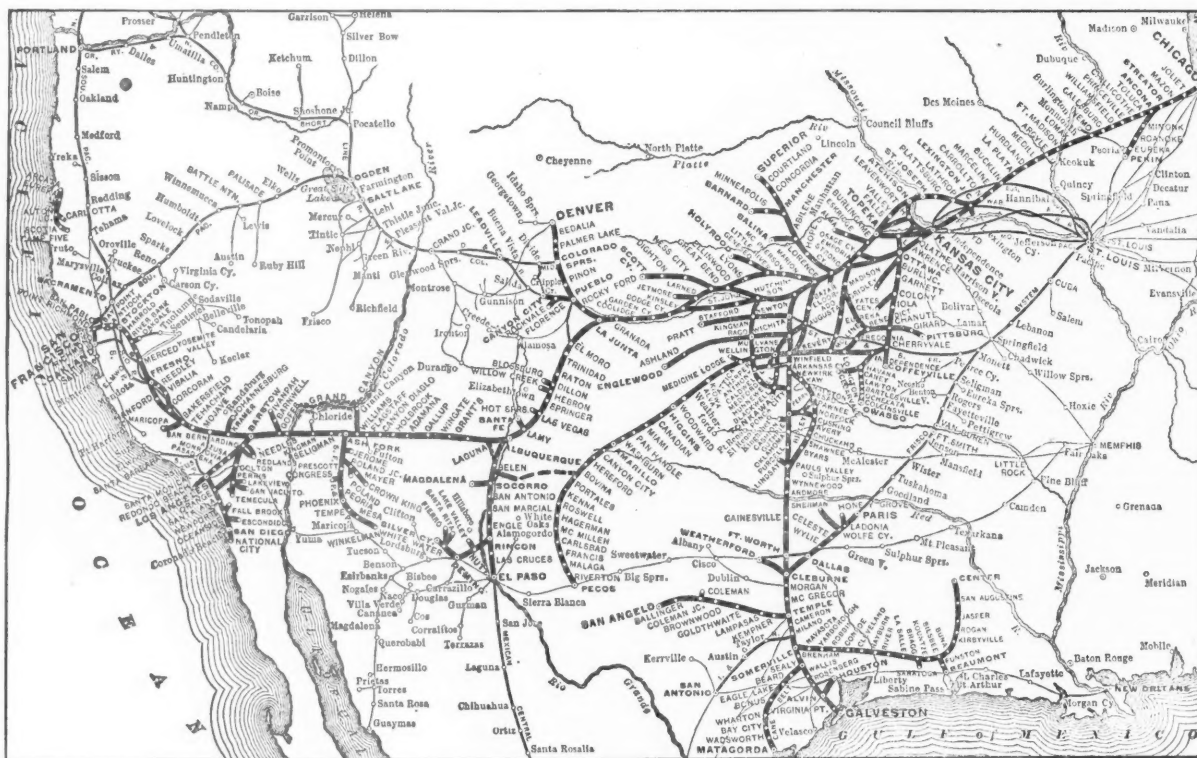
There were 4,730,090,247 tons carried one mile against 4,682,269,811 in 1904, an increase of 47,820,436 ton-miles for the year. The average distance each ton was carried increased from 355 miles to 367 miles. Had the average earnings per ton-mile, which decreased 18/100 of a mill, remained as high as in 1904, there would have been an increase of \$851,416, instead of a decrease of \$353,671, in freight earnings. The rate received was 1.002 cents against 1.020 cents in 1904. The earnings per passenger-mile also decreased from 2.180 cents to 2.158 cents; but an increase of 666,943 in the number of passengers and 35,380,000 in the number of passengers carried one mile compensated for this and made an increase of

\$611,607 in passenger earnings. The freight traffic was almost evenly divided between eastbound and westbound shipments, there being an excess of 351,549 tons eastbound. Westbound earnings, however, exceeded eastbound by \$3,743,188, the higher grade traffic evidently coming from the east. The average train load was 282 revenue tons, an increase of 12 tons, or 4.46 per cent. Products of mines furnished 32½ per cent. of the total tonnage against 30 per cent. in 1904. Of the total of 4,191,123 tons under this head, bituminous coal was 1,908,070 tons, and stone and sand, 1,039,553 tons, the latter an increase of 285,554 tons over 1904. Products of agriculture furnished the next largest percentage, 25½ per cent., of the total tonnage. The total tonnage of grain was 1,486,781 tons against 2,172,682 tons, a decrease from 16½ per cent. of the total tonnage in 1904 to 11½ per cent. in 1905. Manufactures were 14.63 per cent. of the total, against 13.21 per cent. in 1904, and merchandise (l.c.l. tonnage), 6.86 per cent. against 6.50 per cent. in 1904, small but valuable increases in high-class tonnage.

During the year there was expended for additions and improve-

During the year the privilege was given to holders of preferred and common stock to subscribe for 4 per cent. convertible bonds to the extent of 15 per cent. of their holdings. These bonds, in amount \$32,420,000, bear interest from April 1, 1905. Including this amount, most of which will not be issued until September 30, the funded debt on July 1 amounted to \$265,986,500, and the actual interest charges for the year ending June 30, 1906, will amount to \$10,589,958.

The uniformly conservative policy of the management of the Santa Fe since the reorganization has been pursued during the past year. Unfortunately the severe natural handicaps to economical operation have resulted in a large decrease in net earnings, but with the line strengthened and improved, and barring a repetition of such unusual conditions, there should be a fine showing made in the year now under way. The grain crops, which are of no small importance to the road, are large, and business conditions generally are favorable. As the only road which has a line from Chicago to the Pacific Coast the Santa Fe has long been an important



Atchison, Topeka & Santa Fe.

ments a total of \$8,737,509, against \$11,609,521 in 1904. Of these amounts, \$4,253,630 was, in 1905, charged to earnings, and \$3,378,970 in 1904. The remaining amounts, \$4,483,879 in 1905 and \$8,230,551 in 1904, were charged to capital account. In this large charge against earnings in so disastrous a year, the showing made by the system is good.

One important policy inaugurated during the year was the increasing of second track by about 100 per cent., made necessary by the density of traffic on portions of the main line. Appropriations were made for building 161 miles, most of it in Illinois, Missouri and Kansas. All of this is to be finished by the end of the calendar year, when a total of 323 miles of second track will be in operation. The report states that in spite of adverse conditions, both track and equipment are in better condition than ever before.

Since 1897, there has been charged to operating expenses for maintenance of equipment \$61,735,742. At the beginning, in 1897, this expenditure was \$534 per mile, and it has risen to \$1,314 per mile in the year just closed. During the year there was added to the credit of rolling stock replacement fund, \$1,601,363, of which \$1,491,408 was charged to operating expenses and \$109,954 was collected in cash for equipment sold and destroyed. In addition to the 8,318 miles of line covered by the report, the company controls, through ownership of securities, 986 miles of line of auxiliary railroad companies. During the year, \$681,306 was received as the net proceeds of sales of lands embraced in the Santa Fe-Pacific Land Grant. This sum was, however, written off the book value of railroads, franchises and other property, so that the transaction does not appear in the income account. In addition to the \$2,500,000 serial debenture bonds redeemable February 1, 1905, there have been purchased and cancelled \$1,301,000 of the series of bonds falling due February 1, 1906.

gauge of industrial conditions on two-thirds of the continent, and for this reason the outlook for the ensuing year is bright.

The principal statistics of operation follow:

	1905.	1904.
Mileage worked .....	8,305	8,180
Freight earnings .....	\$47,408,982	\$47,762,653
Passenger earnings .....	16,045,380	15,433,774
Gross earnings .....	68,375,837	68,171,200
Maint. way and structures .....	11,385,418	9,170,234
Maint. of equipment .....	10,914,864	10,006,135
Conducting transportation .....	21,362,860	21,295,960
Total expenses .....	45,577,384	42,222,033
Net earnings .....	22,858,453	25,949,168
Gross income .....	69,189,740	68,171,200
Net income .....	11,742,346	15,359,771

#### TRADE CATALOGUES.

**Nernst Lamps.**—The Nernst Lamp Company, Pittsburg, Pa., sends its "Central Station Bulletin" for September, as well as a small pamphlet describing and illustrating in detail the Nernst 220-440, 3-wire A. C. system of lighting for small cities, etc.

**Ring Type Generators and Motors.**—The Northern Electrical Manufacturing Company, of Madison, Wis., sends Bulletin No. 51 covering its Northern ring type machines for power and lighting service. There are very complete illustrations of the ring type generators and motors, as well as of the detailed parts, with several descriptive tables.

**Electric Railway Apparatus.**—The Westinghouse Electric & Manufacturing Company has issued a special publication under the title of "Westinghouse Railway Apparatus" for distribution at the convention at Philadelphia of the American Street Railway Association. The pamphlet illustrates and describes the kinds of alter-

nating and direct current railroad motors made by the company, as well as generators for railroad work and systems of control for electric railroads. It also describes with illustrations the Westinghouse system of catenary line construction for street railroad work. There is included information covering detail and repair parts of motors and other railroad apparatus.

**Pipe Joints.**—The Crane Co., Chicago, has issued two advance circulars; one dealing with its No. 181 E "Cranelap" extra heavy flanged pipe joints, with swivel flanges, and the other with its No. 295E "Craneweld" flanged pipe joints, with wrought steel flanges welded on; both suitable for working pressures up to 250 lbs. Sectional views, dimension drawings, tables and price lists of both styles of joints are given. The No. 181E joints can be furnished with flanges made from cast-iron, ferrosteel, malleable iron, cast steel or weldless steel.

**Curve Lining Gage.**—F. A. Smith, Chicago, sends a two-leaf folder of his curve-lining gage. The device is illustrated and its design and method of use described.

## CONTRIBUTIONS

### "The Division Engineer in Railroad Work."

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Railroad Gazette*, September 8, is an article by Mr. Willard Beahan, on the Division Engineer in Railway Work, which is of a kind altogether too rare in the columns of our journals.

There are two or three points upon which he touches which the writer wishes to emphasize. The first is his putting the handling of men ahead of every other qualification. I have in my mind a most excellent civil engineer, when engaged in the smaller duties, but when he became chief engineer it was no unusual thing to see him working over the drafting table with assistants and stenographer idle. When one venturesome assistant asked him one day for something to do, the toiling engineer exploded to the effect that he had only two hands, and they were both busy. How can such a man as this ever rise above the using of his two hands?

The late Collis P. Huntington, when organizing his eastern system of railroads, met a capable Division Superintendent who was in charge of a division of what was then known as the Ohio & Mississippi Railroad. Mr. Huntington appointed him later Superintendent of his line from Louisville to Memphis. On visiting the Louisville office one day he asked for his superintendent, who was not in his office. His chief clerk said "He is down in the yard." Mr. Huntington went down into the switching yards and there found his superintendent throwing a switch. He was doing the work well. Mr. Huntington complimented him on it, but reminded him that if he spent too much of his time at that switch he might be compelled to send the switchman up to the superintendent's office. Some men can never learn that they are paid for doing a higher class of work than throwing a switch or making a drawing.

Towards the end of his paper Mr. Beahan speaks of the fact that we as engineers are coming to be useful just because we can put a dollar where it can earn more than where another man can put that dollar. If we can thoroughly disabuse our minds of the idea that the title, engineer, gives us any special claim on any job whatsoever we will have advanced ourselves materially. Comparatively few engineers are good at handling a gang of men, and when one of them takes charge of railroad work he will usually do well to leave the handling of this gang to the section foreman, or extra gang foreman.

The writer of this has by force of circumstances been compelled to handle gangs, running from 20 to 60, of nearly every nationality which serves on railroad work. It includes Chinese, Japanese, negroes, Mexicans, Austrians, Italians, and the mixed "navvy." He has never met with any two of these classes who could be managed by exactly the same method. He will say right here that with the first three mentioned above he never considered himself a howling success. He was able to master the handling of the Mexican; got along very well with the Italian; and has made a record with the "navvies"; but this accomplishment was acquired by watching the way his most successful foremen handled their crews. After the ability to handle his subordinates the greatest necessity, it seems to the writer, is for the engineer to get along peacefully with his neighbors. He is apt to be a better educated man than the trainmaster, or even the master mechanic, with whom he must come in contact on his division. In most localities there is a sort of chip on the shoulder for the educated man in railroad circles. It is a good plan to be blind when looking at the point where this chip may be. A railroad division is very much like an army division. All the officers must work together. Lack of harmony amongst them has lost many a battle. Lack of harmony in a division writes its record in various mishaps all over the division.

Mr. Beahan is strong against letter writing. There certainly is both a use and abuse of letter writing, but I am a strong believer in written reports. A thing every subordinate should be required to do is to make frequent and regular written reports to his superior. The fact that he has to account for spikes, oil, and other loseable property, makes him look more carefully after such things. If, besides this, the records are written up in the division headquarters, and it is passed down the line with the cost of doing the various work on various sections, it helps keep up enthusiasm. Without this many even among good men are inclined to be a little easy and let things drift.

It certainly is essential if letters of instruction be written, that the superior officer should get around frequently enough to know by personal contact with his assistant that they have received those letters; that they have understood those letters; and that they have put into effect the orders contained in them. It was my fortune to be located upon one road where the roadmasters uniformly laid the letters which came to them to one side, knowing well by past experience that no effort would ever be made to know whether those orders were ever carried out or not; and each section foreman ran his section according to his own ideas.

The writer had an experience, serving for 12 years, coming up from axman and rear chainman to be division engineer on construction, entirely under one man. This man was not a letter writer, and it was before the days when typewriters were in common use. When the writer entered the service of another railroad, he was thrown under a letter writer. While his office was in the same room with the resident engineer, during the four months they were together he never received a verbal order from his superior. If he asked any advice on any subject he would within an hour or two have a letter laid on his table giving instructions on that point. Perhaps it was his lack of worldly wisdom, due to the narrow surroundings of his earlier life, but he carried out the instructions contained in one letter so literally that it was necessary to rebuild a bridge. It is perhaps needless to say that some of the doings of this residency brought letter writing into disrepute on that road.

I wish to fully indorse Mr. Beahan's opinion on letter writing, and at the same time to say I would require from roadmasters, bridge foremen, and section foremen, weekly reports covering the most important things, and have a complete monthly report. These things should go on record. The subordinate has comparatively little use for a record provided he has a superior in whom he feels confidence and who gets around to talk with him occasionally.

C. M. V.

### The Railroad Systematizer.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Two editorial notes which appeared in the *Railroad Gazette* March 3 touched upon a subject which in my opinion demands more attention than you and your readers are giving to it, and with your permission I will indulge in a little amplification of what you said. I refer to the economizing of blanks on the Pennsylvania and the intelligent use of publicity on the Long Island road. On the Pennsylvania, as a result of conferences between the operating, the traffic and the accounting departments, 100 blank forms were done away with, which in the aggregate means, of course, a large saving in work. On the Long Island road the President, after failing, by the ordinary means—interviews with citizens and with daily-paper reporters—to convince the public of the fairness of an advance in passenger fares which had been made, adopted the novel course of setting forth his defence in the shape of letters—advertisements—in the newspapers. His letters were not exactly in the shape of "display ads," but they were printed in large type and put in such shape that they were sure to attract the eye of every reader.

Now, these incidents furnish strong support for two of what seem to me most essential principles in railroad management: First, that no new form of record or report whatsoever should be put into use on a railroad until it has been examined and approved by an expert systematizer reporting direct to the President; and second, that it is to the interest of every large railroad to take its employees, and incidentally the public, into its confidence, by the publication of a weekly or monthly journal, to be circulated gratuitously among employees, and devoted to the discussion of all matters pertaining to the operation of the road.

The professional systematizer has become indispensable in our industrial and commercial institutions, and although he avails himself largely of engineering knowledge, his greatest efficiency lies in the designing, and the education of employees in the use of, simple systems of records which give to officers, at the earliest possible moment, and with a minimum of labor on the part of employees, exact knowledge of the condition of every vital detail of the business, and the net results obtained.

The railroad systematizer should by experience and constant

association be familiar with the duties of every employee, and thus be competent to judge, whenever it is proposed to inaugurate a new report or record, whether the information desired is not already accessible in the records of some department, whether it cannot be obtained more economically in some other manner, and if, when obtained, it will serve a purpose commensurate with the cost of compiling it, measured in actual increase of wages paid, cost of stationery, the discontent engendered among employees by burdening them with labor which they know to be unproductive, and the accidents and losses caused by diverting their attention from more important duties.

A Railway Systematizer would of necessity report to the President only, as his work would in many cases antagonize departmental incompetents and faddists, bent upon aggrandizing their own departments at the expense of labor appearing on the payrolls of others, and in many cases burdening their own employees with useless work in order to demonstrate some personal hobby.

In the matter of co-ordination of departmental records, most railroads are now practically without a head, as the President obviously cannot give personal attention to the details necessary for the purpose. The result is that an aggressive head of department carries his point in every case. One department will submit to the impositions of others, rather than provoke friction by referring them to the President, which might be construed as a violation of professional etiquette.

This question of professional etiquette is indeed responsible for much useless work on railroads, and it even affects retired officials as well. Many a useless or long outlived report is made for years and religiously filed away without examination, because its withdrawal would be a tacit admission of its uselessness, and a reflection on the officer who originated it. The writer in recommending the withdrawal of such reports has been met with the reply, "Of course we do not use the data, but the men who furnish it have plenty of time to spare, and they think that we check it, so that it serves the same purpose." Both these ideas are fallacious. If errors in such reports are passed over unnoticed the maker does not need to be told that the report serves no purpose. If he is conscientious he may continue to make it carefully, but he is much more likely to save labor by "faking" it.

That any additional labor whatsoever can be imposed upon an employee, without its value eventually appearing in the salary, or in the accident, or loss and damage account, is a mistake. While there may be an occasional apparent exception, in the long run the rule holds good that "you cannot get something for nothing."

The burden of useless and duplicated records and reports is largely borne by the transportation department. Notwithstanding the unification of recording methods accomplished by associations of railroad officers, on many roads agents still record every transaction in a book, transcribe it to a daily or weekly report, rearrange it in a monthly report, and finally dissect it in detail from a statistical standpoint, when every one of these operations but the first could better and more cheaply be carried out in an audit office by men trained to do that one thing only. Conductors spend hours when nominally off duty, in making out complex reports, or endanger the safety of their trains in order to make them "on the company's time." Both agents and conductors often telegraph an analysis of the day's work, viewed from a multiplicity of standpoints, to various officials who, after the novelty of the new report wears off, do not give it a casual glance. Agents, operators and dispatchers handle stacks of messages mostly not only uncoded, but written in conversational style, which if charged for at one-tenth commercial rates, would more than offset any value to be derived from them.

Occasionally an auditor rises superior to the mere consideration of an economical showing for his own department, and by a centralization of work in his office with a consequent increase of his own payroll, effects a saving for the road, much of which cannot be measured in dollars and cents. But even if he is sustained in this policy, there still remains the necessity for many similar reforms which lie outside his control. Only an officer whose authority extends to all departments, and whose sole business is to keep in personal touch with the making and handling of the records, can judge of their efficiency in practice and promptly attend to the weeding out of unfit and the substitution of simpler records, which the constant change in operating methods makes necessary everywhere.

The purpose of an official periodical published by a railroad should be mainly educational. Employees should be encouraged to study the reasons underlying every rule, and when the reasons are not plain to them, be allowed to make inquiries or to criticize the practical working of the rules. This may be done anonymously if they so desire, in fact preferably so. Such communications should be published, together with an explanation prepared by a competent officer.

The educational benefits to be derived from the publication of frank discussions between officers and men would by no means all accrue to the latter. Officers would soon hesitate to issue orders

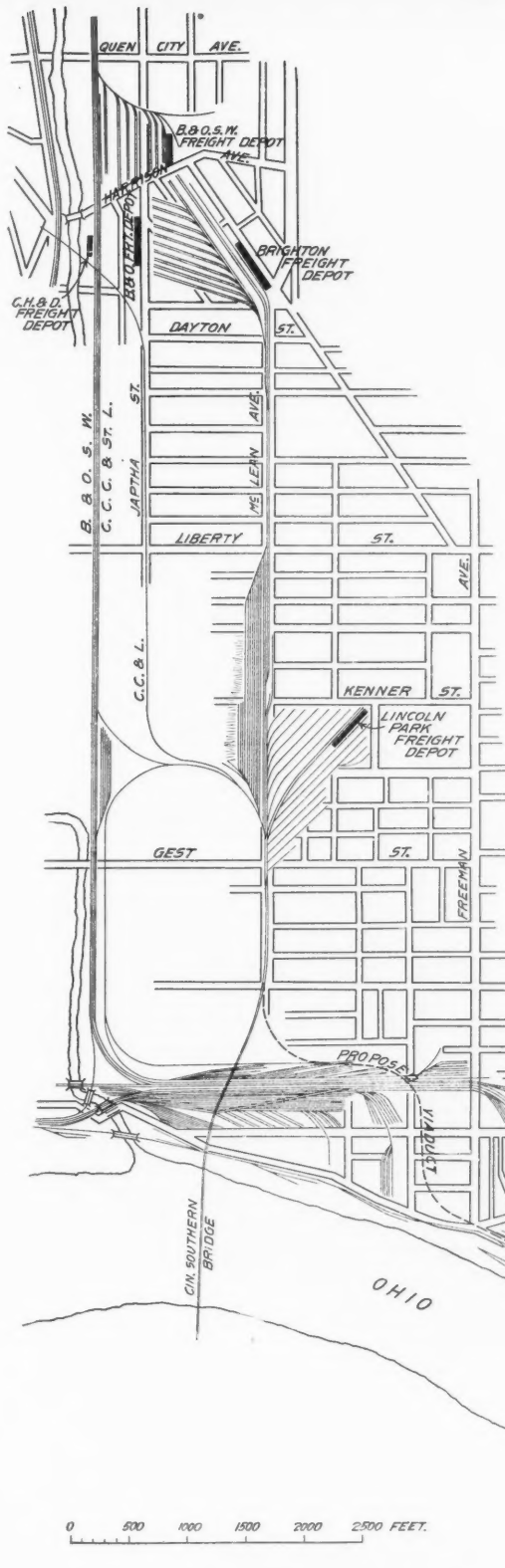
which were not defensible from a standpoint of fairness and sound common sense, were they deprived of the mantle of official infallibility with which they so often seek to clothe themselves. No officer who gives his men to understand that he is competent to do all the thinking, and that their duty is only to obey orders blindly, can command their respect or co-operation. No railroad can afford to countenance any policy in dealing with its employees which will not bear the test of publicity and of frank discussion. As was evidenced in the case of the Long Island Railroad, previously referred to, the public is quickly satisfied with a plausible explanation, when proffered, of what previously was viewed as a mere edict by circular, and seemed to be an autocratic abuse of power. The point to be noted, however, is that for weeks the same explanation was proffered verbally to citizens' committees and newspaper reporters, but that the garbled versions of it which appeared in the press only served to inflame public indignation. As soon, however, as it appeared in the public press backed by the signature of the president of the road, the agitation immediately subsided. This must have been due to the publicity given to reasons which were presumably incontrovertible. As railroad men are not less amenable to reason than the public generally, such a policy as between a railroad and its employees, in dealing, at their inception, with the causes that sometimes lead to disastrous strikes, could not but be beneficial. It is usually the case after such a strike that each side learns that the statements of the policy of the other, delivered verbally and perhaps imperfectly expressed in the beginning, have been greatly distorted by the successive prejudiced interpretations placed upon them by the persons transmitting them. This would be obviated by the publication in an official journal, of both sides of the question, which would put each clearly on record before every man interested, bring officers and men closer together, do away with the one-sidedness which now characterizes both the official conferences and those of the lodge room, render innocuous the oratory of the agitator, and restrain abuses of power on the part of subordinate officials. An appropriate motto for such a publication would be, "A square deal for every man, and for the company as well."

Aside from the discussion of so-called grievances, an esprit de corps could be built up by a series of "friendly talks" in print. These could impress on each employee that every dereliction of duty on his part, even if he evade the responsibility, would serve to discredit not only himself but his fellows with their immediate superior; his division with the management, the latter with the stockholders, and the road with the public. As an instance of such a "friendly talk" the writer has in mind an address recently published in the *Railroad Gazette*, which was delivered by the General Claim Agent of a western line at a meeting of its agents. Such an article, addressed by an officer to the employees of his own line, goes home to each man with a thousand times the force which it would have if read in a journal devoted to the interests of the railroads of the country as whole.

In the days before the standardizing of train despatching rules, the western transportation man's most valued book of reference was a Union Pacific time-table, each issue of which contained all the queries which had been made to date regarding seemingly ambiguous or conflicting rules, together with the official ruling governing their interpretation, the latter always expressed in such a form as to render the reasons underlying it apparent. As a clearance from the Union Pacific was then sufficient to secure employment anywhere for a conductor, train despatcher, agent or telegraph operator, it is evident that the road was repaid in the efficiency of its men for the increased expense incurred in supplying the entire west with time-tables.

The writer believes that a spirit of personal honor and pride in the road may be, through such a journal, built up among employees in the same manner as is done in many educational institutions. One cannot, however, inculcate honesty without making use of the word and of its opposite—dishonesty; and although the leakage of revenue through the dishonesty of employees is a most vital question to every railroad, it is generally a tabooed subject between officers and men, and the methods employed in checking the latter are surrounded by the greatest mystery. No honest or fair minded man can object to being surrounded by precautions tending to lessen the temptations to which he may be exposed, and these precautions in many cases protect him from being forced into collusion with dishonest fellow employees who might otherwise make his position unpleasant. He has, however, a right to expect that the methods of checking him be fair and aboveboard, and that he be heard in his own defense. The writer has found it advantageous to explain clearly to employees the methods to be used in such checks, together with the bearing which the non-observance of seemingly unimportant rules might have on the result; at the same time impressing upon them that the company does not purpose to await absolute evidence of dishonesty, but will punish by dismissal any employee who, by the violation of such vital rules, gives cause for suspicion.

As an example of an opposite policy, a certain great railroad has for years been noted for its niggardliness in the granting of



Cincinnati Terminals of the Cincinnati, New Orleans & Texas Pacific.

passes to employees of its own and other lines, all passes given by transportation officers being checked against their payrolls, and an explanation demanded where the necessity for issuance of transportation is not obvious. As a result it was for years tacitly understood by every transportation man below the rank of General Manager that each conductor would be allowed to carry free over his run "two railroad men," and in addition to this as many more were "fixed" verbally with the conductor by dispatchers, trainmasters, and superintendents, as they saw fit. When this road covered its trains with "spotters," as it does periodically, it is possible that the auditor made allowances for the two tacitly

allowed railroad men, but many discharges undoubtedly took place due to the carrying of men on the request of officials. With the certainty of being eventually discharged without a hearing, as the result of such a secret check, it is not difficult to follow up the train of logic which would influence a conductor in his dealings with the company. Did the road in question publish such a journal as is herein advocated, so that conductors could anonymously explain their side of the case without imperiling their positions or reflecting on their immediate superiors, the high officials responsible for this pass policy would ere this have discovered that there exists a serious loss of revenue and an injustice to a class of employees as an offset to the apparent economy shown by their exceedingly small pass lists.

The writer believes that this, as well as every other relation between employees and officials, can be discussed impersonally in an official publication, and with advantage to the company.

HENRY BURNETT.

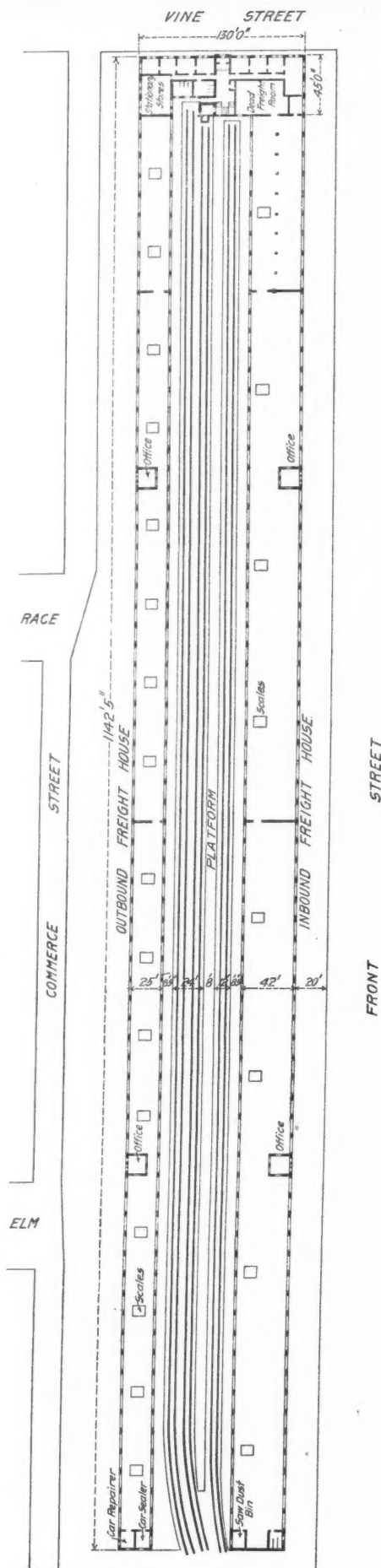
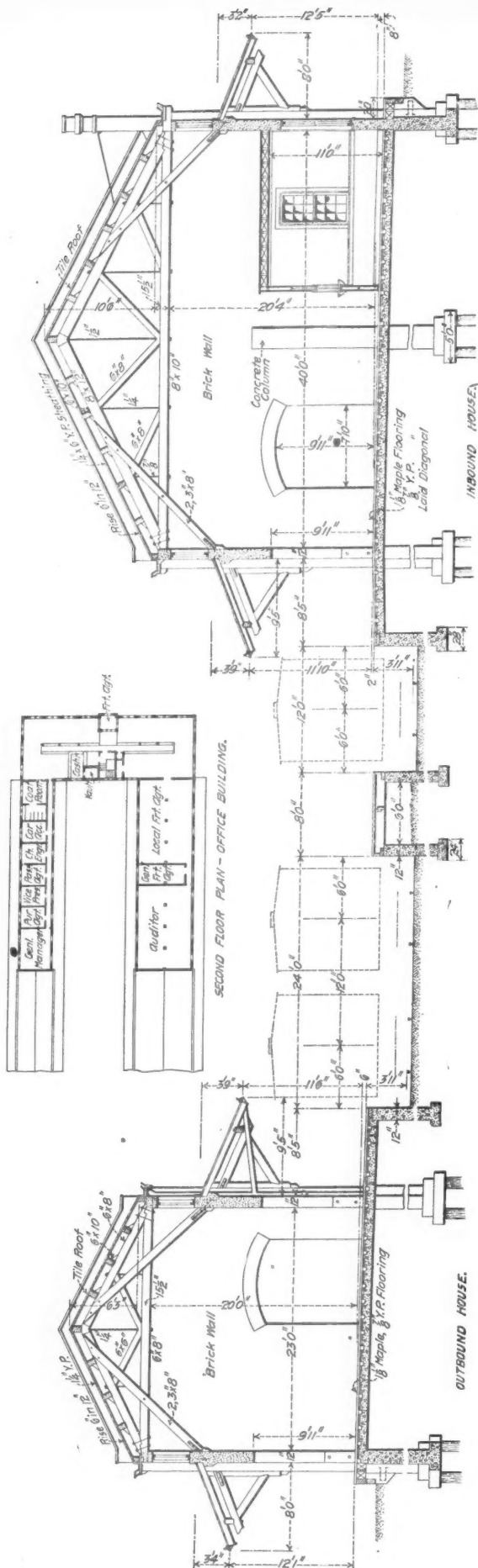
#### New Freight Terminal at Cincinnati, of the Cincinnati, New Orleans and Texas Pacific.

The Cincinnati Southern Railway, as is generally known, is owned by the City of Cincinnati, Ohio. It is operated under a long-term lease by the Cincinnati, New Orleans & Texas Pacific Railway Company, the city's interests in the property being administered by a board of five trustees. As shown by the accompanying map, the road enters the southwestern part of the city over its own bridge across the Ohio river and runs directly north along McLean avenue to yards bearing the same name—its largest Cincinnati freight yards. On the eastern side of these yards is Lincoln Park freight depot, a district freight house about 400 ft. long, which serves an industrial region. Lines run north from McLean avenue yards along the avenue to the Brighton freight terminal in the northwestern part of the city, which is also a district terminal only, serving another industrial region.

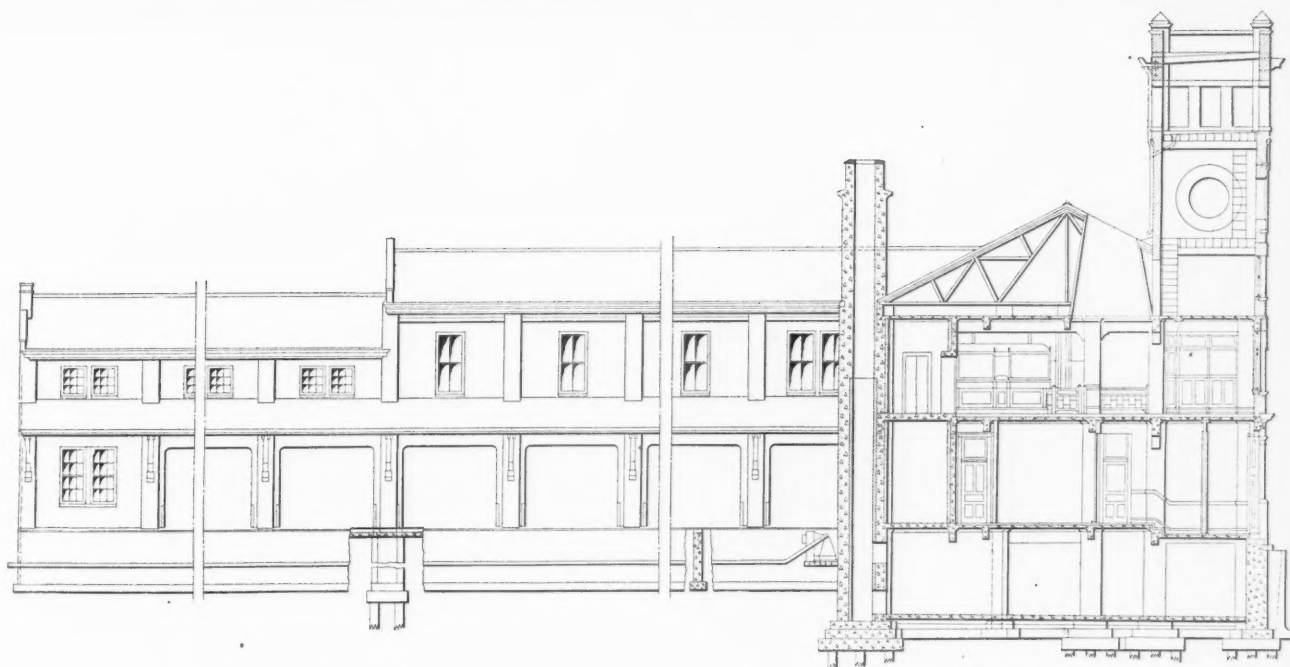
The present principal freight terminal of the road is at Front and Mill streets near the river and is designated on the map. It is rented from the Baltimore & Ohio Southwestern, and is reached by a track of the latter occupying approximately the route indicated for the proposed viaduct. This depot is very old, having been built by the Ohio & Mississippi Railroad in 1857. The terminal is entirely inadequate for the present business of the Cincinnati, New Orleans & Texas Pacific, and is also open to the objection of being

inconveniently situated relative to the business district of the city. The trustees of the Cincinnati Southern accordingly took steps some time ago to provide a new freight terminal more favorably located with reference to the wholesale section of the city, and of a capacity and arrangement that would provide not only for present requirements but that would be ample for the needs of the road for some time to come.

In order to obtain a suitable site having the desired proximity to the wholesale section, improved property had to be acquired at great expense, the outlay for this purpose alone being in excess of \$1,300,000. The new terminal fronts on Vine street and extends



New Freight House at Cincinnati for the Cincinnati, New Orleans & Texas Pacific.

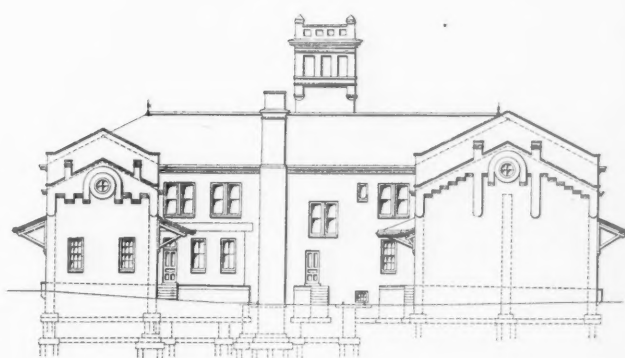


*South Side Elevation of Receiving House.*

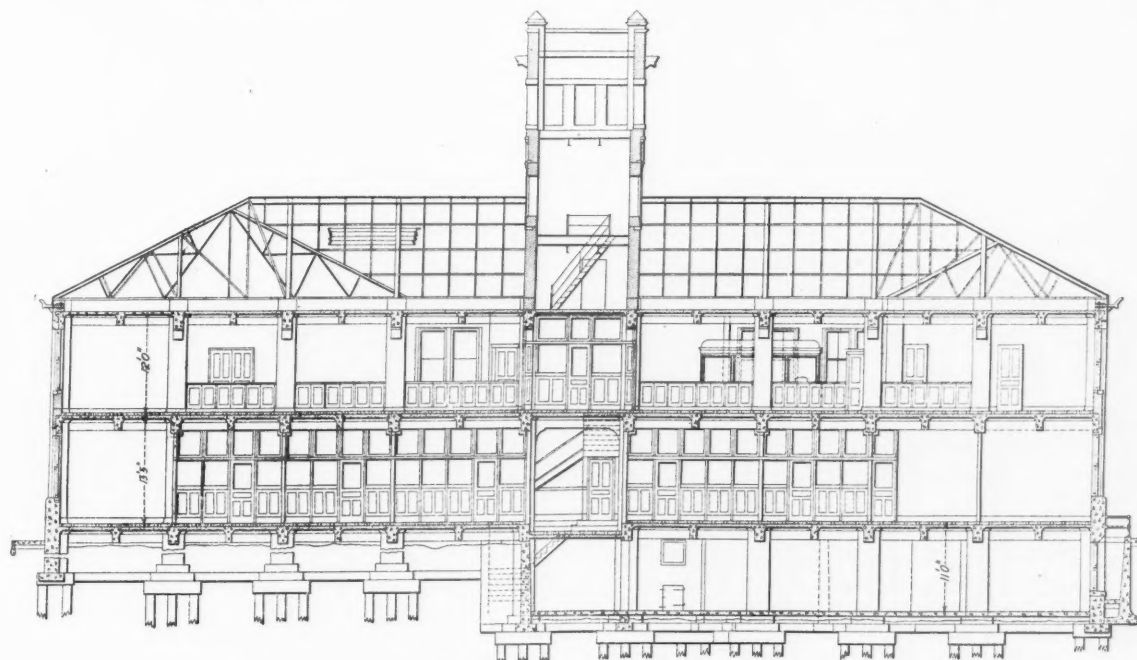
*Cross-Section Through Office.*



*Vine Street Elevation.*



*Plum Street Elevation.*



*Longitudinal Section Through Office Building.*

Vine Street Freight House and Office Building, C., N. O. & T. P., Cincinnati.

westwardly through three city blocks to Plum street. The buildings will occupy the space between Commerce and Front streets, and across the latter, on a tract almost as large, will be team tracks. The entire property was occupied by warehouses from four to eight stories high, some of which had been standing for upwards of 50 years. The presence of abandoned wells, old privy vaults, deep cellars, etc., revealed in the wrecking of the old buildings and the excavating for the foundations of the new, presented difficulties in building the foundations.

The buildings consist of a two-story and basement office part, 130 ft. front on Vine street and 50 ft. deep, between Front and Commerce streets, and inbound and outbound freight houses extending westwardly from same, the inbound building facing Front street and the outbound Commerce street, the whole forming a U-shaped structure. The freight houses are each 1,100 ft. long. The outbound house is 25 ft. wide and the inbound 42 ft. wide, both having a 8½-ft. platform on the track side. Between the two freight houses are three tracks, two serving the outbound house and one the inbound. Between the inbound and outbound tracks is a platform 8 ft. wide and extending practically the entire length of the freight houses. Each freight building has a second story 135 ft. long adjoining the office building, to be used as record rooms for the general offices of the railroad company. The office building is to be of reinforced concrete construction practically throughout, with steel roof trusses and tile roof. It will be faced with pressed brick and have stone trimmings. The freight houses will also be of reinforced concrete, but with wooden roof trusses. They will be without the brick veneering, and the walls and piers separating the doors will show a tooled or floated concrete surface.

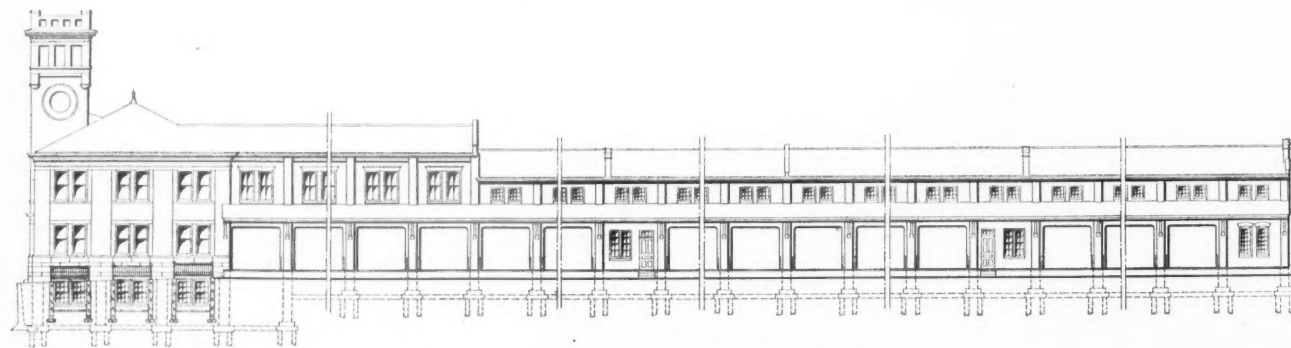
The foundations which were put in differ considerably in detail from those shown by the general plans herewith, these plans having been made early in the year before there was any certainty about the exact location of the terminal and therefore of the soil and

quarter turn and anchored into the concrete by a short vertical rod passing through a hole in its end.

The space under the houses between walls, including the platforms, is filled with earth rammed in layers. On this will be laid a double floor of yellow pine and maple respectively, resting on sills bedded in a 6-in. layer of concrete. The floor of the outbound house has a slope of 6 in. to the edge of the platform at the track side, while the inbound floor slopes 8 in. toward the street side. Both sides of both buildings will have rolling steel doors 11½ ft. wide by 10 ft. high, with piers 3½ ft. wide between all doors. Commerce street, on the north side of the outbound house, will be considerably wider than formerly. This space and all other roads and driveways around the terminal will be paved with granite, or other material to be determined later.

Each track between houses has room for 27 cars, or 81 cars for the three. The capacity of the outbound house will be double that of the present terminal, while the inbound will have six times as much room. All of the switching to and from the present house is done for the C., N. O. & T. P. by the B. & O. S. W. For the new terminal the approach will be over the tracks of two foreign roads temporarily: the B. & O. S. W. and the Pennsylvania, which will do the switching jointly. But proceedings have been begun to acquire land for a viaduct approach about 3,000 ft. long from the north end of the Ohio river bridge. Its route will be approximately as indicated on the map, coming to the surface at its juncture with Front street. From this point the company expects to put in its own surface track to the new terminal.

At the present time the foundations of the buildings have been completed and work has begun on the superstructures. It is expected to have the terminal ready for occupancy by the spring of 1906. Mr. G. B. Nicholson, Chief Engineer of the Cincinnati, New Orleans & Texas Pacific, is Chief Engineer and Superintendent of the terminal work for the Trustees of the Cincinnati Southern.



Commerce Street Elevation, Vine Street Freight House and Office Building, C., N. O. & T. P., Cincinnati.

other conditions to be encountered. The quality of the soil and the condition of the large warehouses, which had stood for years on the site finally chosen, made it evident that piling was unnecessary. Instead, broad footings of reinforced concrete were put in for the columns and pedestals, the dimensions in each case being such as to give a load of 3,000 lbs. per sq. ft. on the sandy clay soil.

Details for the reinforced concrete construction to be employed in the buildings are not yet fully decided upon, therefore drawings of typical designs of columns, girders and floors cannot be shown at this time. The loads for which designs are being prepared are: 125 lbs. per sq. ft. for the first and second floors of the office building; 300 lbs. for the stationery store room and the record rooms over the freight houses; 100 lbs. for all attic floors. It is not anticipated that any unusual design or construction will be used in any part of the buildings. A 1-2-4 mixture of concrete will be used throughout. All footings, beams and floors will be reinforced with Kahn bars, and columns with plain rods ¾ in. to 1 in. in diameter. There are expansion joints where the freight houses join the office building, and every 90 ft. along the freight house walls. The 4-in. x 4-in. floor timbers of the office building will be bedded in cinder concrete. At the rear of the office building will be a plain concrete chimney 56 ft. high and 2 ft. 6 in. square inside. The walls are 21 in. thick up to the roof of the building, reducing above that to 17 in. and then to 13 in. The tower, which is 65½ ft. high above the street, is of brick and steel, with stone trimmings.

As already mentioned, the freight houses have concrete walls with wooden roof trusses and tile roof. A cross-section of both houses and the platform between is shown. The platforms on the track sides of the two houses are covered by roofs bracketed to the building walls. The street sides of the buildings also have each a projecting roof 8 ft. wide. The roof truss knee braces, which are formed of two 5-in. x 8-in. timbers, rest on corbels on the walls of the house. They are each anchored to the wall by a ½-in. by 3-in. strap bolted to the brace. This strap is given a

He is being assisted by H. E. Warrington, Principal Assistant Engineer, and Adam Ritter, Assistant Engineer of the C., N. O. & T. P. The Collier Bridge Company, Indianapolis, Ind., has the contract for the construction complete. The buildings will cost about \$250,000. We are indebted to Mr. Nicholson for the data of this article.

#### Fines for Soliciting Rebates.

At Chicago, Sept. 21, four officers of the Schwarzschild & Sulzberger Company were fined an aggregate of \$25,000 by Judge Humphrey in the United States District Court, following a plea of guilty to indictments charging conspiracy to accept railroad rebates. The defendants were: Samuel Weil, of New York, Vice-President of the company; B. S. Cusey, Traffic Manager; V. D. Skipworth, and C. E. Todd, Assistant Traffic Manager. Mr. Weil was fined \$10,000 and the other three \$5,000 each.

With the entering of the plea the statement was made that unless at least one of the cases was immediately settled the life of Mr. Weil would be jeopardized, his nerves being shattered. The plea was entered, it is said, after an understanding with United States Attorney General Moody that the jail provision of the law, under which the indictment was returned, should be waived and only a fine imposed. The four men were accused of unlawfully combining and agreeing to solicit rebates for the Schwarzschild & Sulzberger Company from the Michigan Central, the Chicago, Rock Island & Pacific, the Grand Trunk Western, the Lehigh Valley, the Boston & Maine, and the Mobile & Ohio railroads. Charges were also made that the defendants had conspired with each other in presenting supposed claims for damages which were in reality claims for rebates.

The plea now entered does not in any way affect the charge of interference with government witnesses made in a previous indictment returned against Mr. Cusey and other Schwarzschild & Sulzberger men. Max Sulzberger at once gave his check for the

total amount of the fines. It is said that it cost \$16,000 to collect evidence against the four defendants and bring about their indictment.

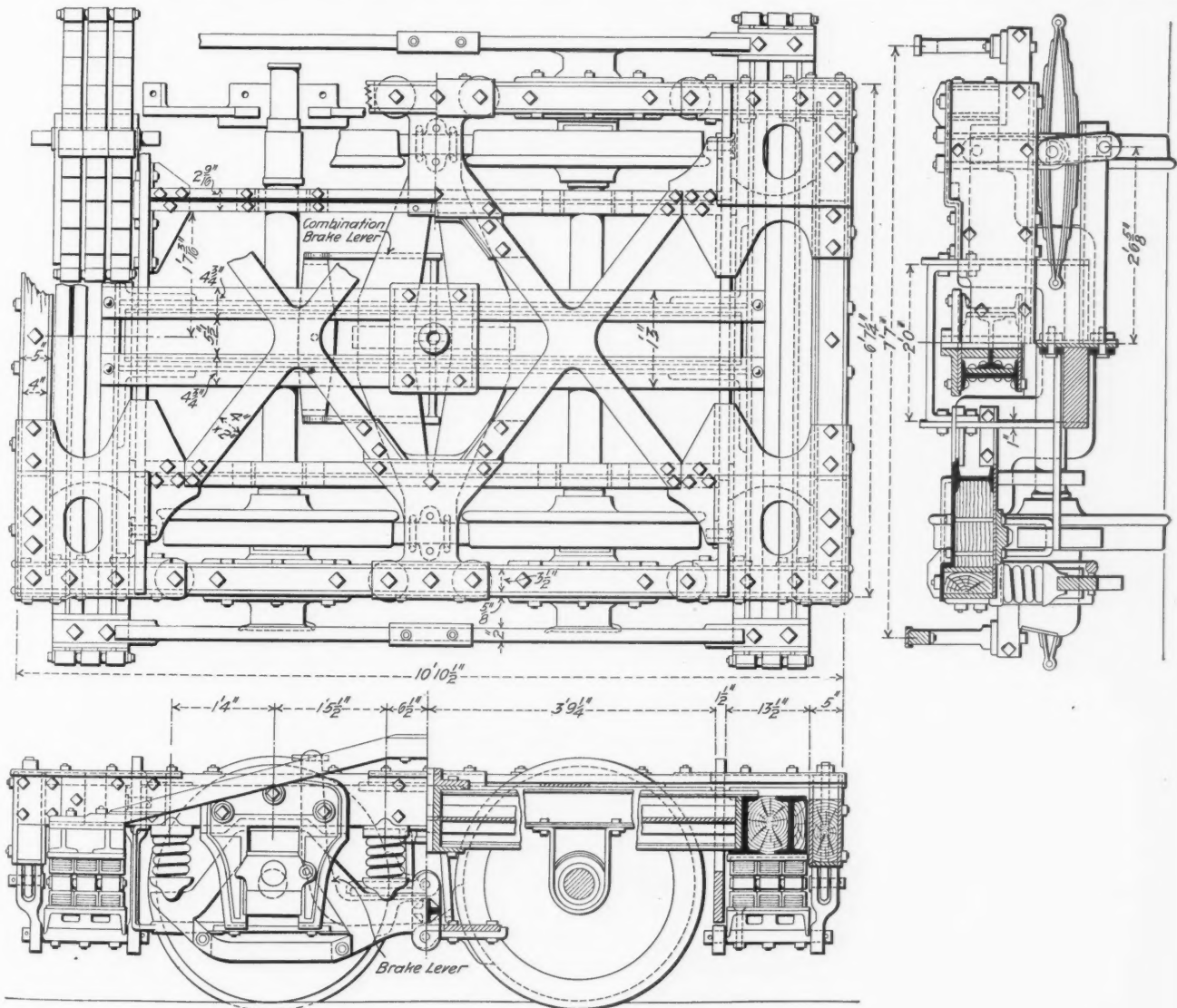
#### A New Four-Wheel Passenger Truck.

Mr. T. N. Hyden, Chicago, has designed a four-wheel passenger truck in which he has endeavored to embody the good qualities of the six-wheel truck, at the same time effecting a reduction of weight, and of construction and maintenance cost. The drawings show that the chief points of difference from the usual four-wheel truck are: the short wheel-base, the placing of the bolsters and spring planks at the ends of the frame, and the extension of the equalizers at each end to provide for an additional spring. These features required a novel frame construction, in which it was endeavored to combine strength and rigidity.

The wheel pieces of the frame are plated with  $\frac{5}{8}$ -in. plates

which are stiffened vertically by plates riveted to the inner sides of the webs. These plates are joined across at the ends, forming, in fact, a rectangular frame. Inside of the frame is an 8 in. I-beam placed horizontally for lateral stiffness, its flanges being riveted through the stiffening plates and webs of the 9 in. beams. The bridge beams rest on top of the bottom flanges of the 9 in. bolster beams and are secured thereto by bent plates. Two bolts pass from the end of the stiffening frame through the bolster. Also, the top flange of each bridge beam is extended over the top flange of the bolster beam and riveted to it. The bolsters are two 9 in. I-beams with a seasoned oak filling beam between. They are reduced in depth at the ends to extend under the wheel pieces and carry the side-bearing beams. These latter will be made of cast-steel not quite to the form shown in the drawings.

The spring plank, which is a 13 in. 40 lb. channel, flanges down, is swung from the end pieces and transoms. A cast-iron filling block is interposed between the spring plank and hanger



The Hyden Four-Wheel Passenger Truck.

and the end pieces with  $\frac{1}{2}$ -in. In addition there are members corresponding to the safety beams of the ordinary four-wheel truck, and others which combine the characteristics of the middle transom of the six-wheel truck with those of the four-wheel truck transom. These latter members are placed 13 1/2 in. inside the end pieces. They are heavy forged or cast-steel pieces which are U-shaped at the middle to pass around the center-bearing bridge. The safety beams, which are 6-in., 17 1/4-lb. I-beams, are rigidly connected at their ends to the transoms and at the middle to the wheel pieces. At each corner of the frame is a heavy plate of either malleable iron or cast-steel, securely bolted to the wheel and end pieces and the transom and safety beam. Additional lateral stiffness is secured to the frame by two X braces between the safety beams.

The center-bearing bridge is formed of two 9 in. 35 lb. I-beams

axle. The burden springs are three-bundle elliptics, with seats of either malleable iron or steel. The extension of the equalizers beyond the journal boxes to provide for additional equalizer springs has been mentioned. The equalizer is braced across below each pedestal somewhat similar to the bracing of a locomotive frame pedestal.

The brake rigging embodies a special lever device, which may be seen on the plan and side elevation, the latter showing it in broken lines. It provides for inside-hung brakes and is essentially one lever for the two beams, the fulcrums being so placed as to equalize the pressure on the two beams.

Mr. Hyden estimates that the saving in weight of his design over a six-wheel truck would be about 8,000 lbs. per car, and the saving in cost of making would be several hundred dollars. He has patented the design.

## Union Highway Crossing Bell.

The Union Switch & Signal Company has lately brought out a new design of highway crossing signal—an iron post and sign with a relay box—that will take the place of the former designs, which were largely of wooden construction. The new design is shown in the accompanying illustration, Fig. 1. The advantages of this design, with its more durable parts, are obvious. The wires connecting the tracks, batteries and instruments, being run entirely inside the post, are protected both from weather and from malicious interference.

The bell fixed on the top of the post is of the well-known Rousseau type, its working parts being protected by its own gong and a semi-circular metal hood above it. This bell requires only eight cells of caustic potash battery to operate it, and the battery is kept in the cast-iron box at the foot of the bell post. The sign is a cast-iron ring 3 ft. in diameter, with raised letters cast on each face. It is made of two similar sections bolted together. It has an advantage over the usual wooden sign, in that it does not require the services of an expert to repaint it, the raised letters making the job comparatively simple. Signs (rings) can be made from any design, with lettering to suit the requirements of different state laws, without changing any of the other parts.

The relay box will hold two interlocking relays, or four simple relays, as conditions require, and is absolutely water and dust proof, being fitted with a gasket of rubber tubing and a special hasp for forcing the door tight against the gasket, similar to the design employed in the Union Company's well-known electric semaphore signal.

The interlocking relay used on single track lines is shown in Fig. 2. This design embodies all the features of the standard enclosed relays, manufactured for a number of years by the Union Company, the cores, magnets, and armatures being identical with those of the "Universal" type of relay. It can be equipped with



Fig. 1—Union Crossing Signal.

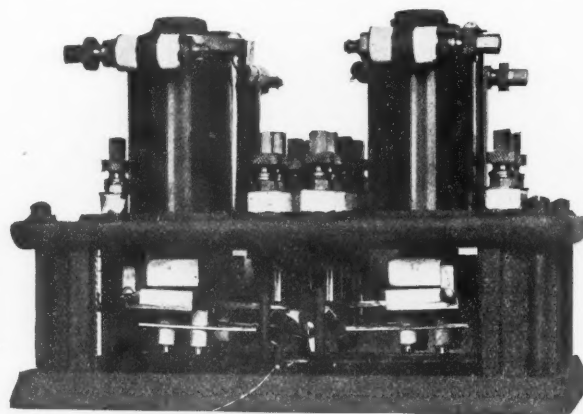


Fig. 2—Union Interlocking Relay.

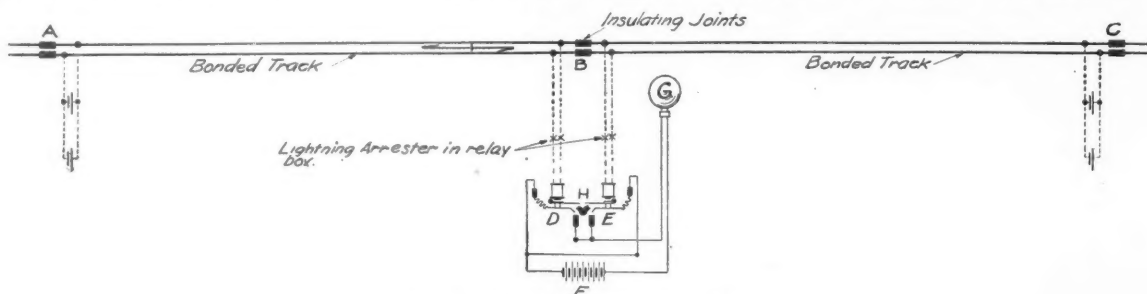


Fig. 3—Single Track Crossing Bell.

platinum or carbon contacts, as desired, and is provided with high grade insulation throughout, thus insuring immunity against any ordinary lightning discharge. All relays of this design are tested with an alternating current of 5,000 volts before leaving the factory.

The locking arrangement between the two armatures of the relay is an adaptation of the original Scott design, used for many years by the Union Company. On double track, the locking arrangement is omitted entirely, and each side of the relay operates independently of the other, the whole instrument being practically two relays mounted on a common base.

The connections for a single track crossing are shown by Fig.

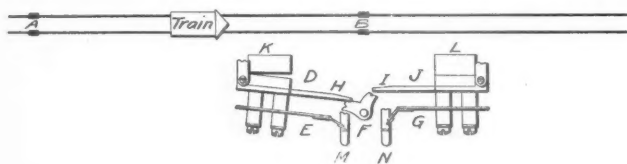


Fig. 4.

3. The track is bonded for from 1,500 ft. to 3,000 ft. on each side of the crossing from A to B and C to B. As a train enters from either end the interlocking relay makes back contact on one or the other of the fingers attached to the armatures of coils D or E which completes the local bell circuit of battery F. To stop the bell as soon as a train has cleared the crossing that part of the relay controlled from the section beyond the crossing is prevented from acting by the locking pawl H which, when D is dropped, keeps H from dropping far enough to close the local circuit.

Fig. 4 shows the normal condition of an interlocking relay when the coils are energized, with the armatures "picked up" and the controlling track sections unoccupied. D and J are the armature bars, carrying contact arms E and G. H and I are the interlocking arms, carried by D and J and insulated therefrom, notched to engage the locking pawl F; M and N are contact points. Fig. 5 shows the condition of the relay after a train has entered the track section A B. The coils of magnet K are de-energized and

D has made back contact with post M. Arm H in falling throws locking pawl F to the position shown and thereby prevents contact being made between G and N, when the train passes beyond B and de-energizes magnet L. The armature J cannot fall far enough to make the contact as the notch in I catches on the pawl F. This condition will continue until the train clears section A B, when armature D will be lifted and open the contact between M and E, thereby breaking the local circuit passing through M and E, and the bell will stop ringing. The armature J remains

down and locked. As the train continues on and clears section B C, armature J will rise and the relay will be in its original and normal condition.

On double track an interlocking relay with the locking pawl removed is used to control the local bell circuit. Two ordinary relays would answer, but it is often desirable to maintain the interlocking type as a standard for bell work, and besides it is more economical of space.

The Prussian Railroads have ordered eight hospital cars, as we may call them, to be stationed at different places in the country

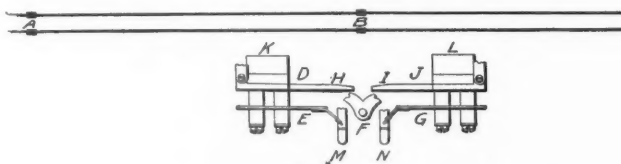
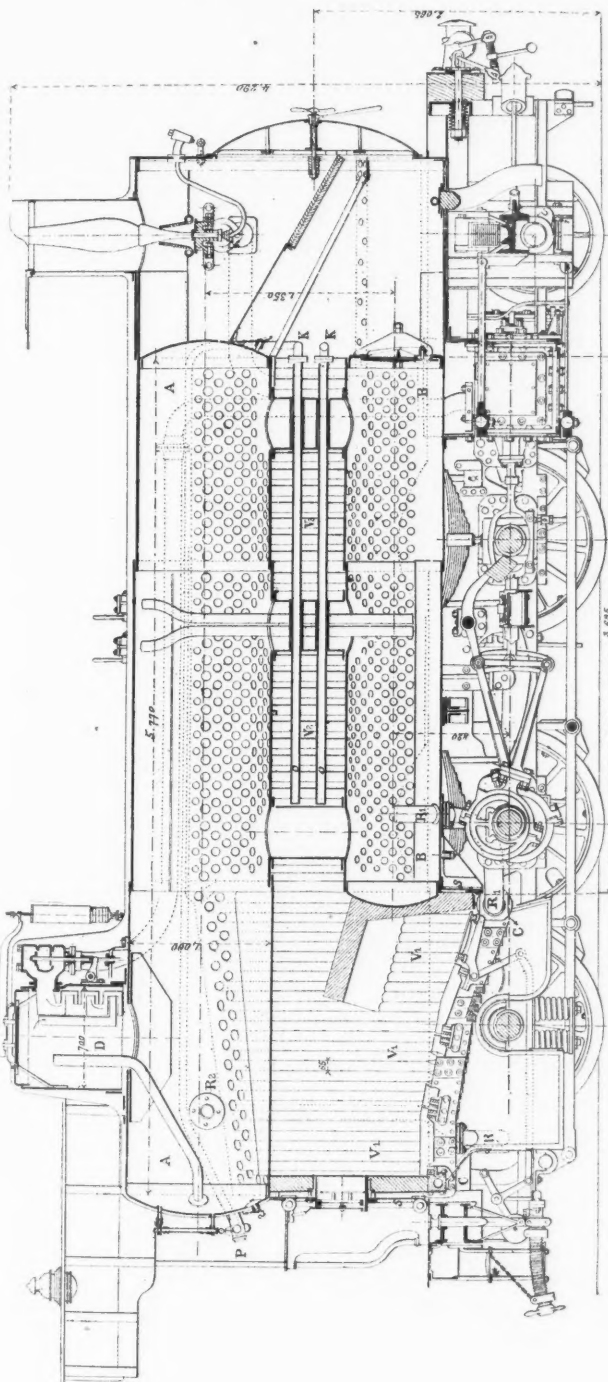
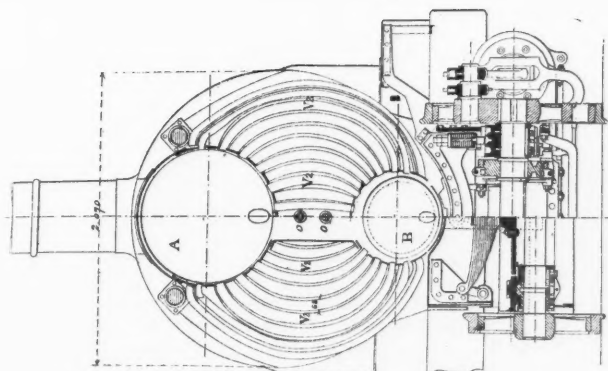


Fig. 5.

for the transportation of people too ill to sit up and requiring the attendance of doctors and nurses. Each car has a sick room with bed for the patient and reclining chairs for attendants, opening into another compartment also provided with a bed, and a servant's compartment. All the appliances likely to be needed in a sick-room are provided and conveniently at hand. One of these cars can be ordered at any station, on the purchase of 12 first class tickets for the route over which it is to go. The first of the eight has recently arrived at Charlottenburg, a suburb of Berlin, where it will be stationed.

Robert Water-Tube Locomotive Boiler.



Robert Water-Tube Locomotive Boiler.

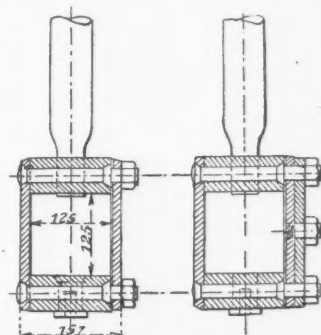
The water-tube boiler that has achieved such economical results in marine and stationary practice offers an attractive field for experiment on the locomotive. According to *La Genie Civil* a boiler of this type has been built and for more than a year in successful working on the Algerian lines of the Paris, Lyons & Mediterranean Ry. by M. Robert, the chief engineer. The boiler is of the Yarrow type though still preserving, in external appearance and method of location on the machine, the ordinary form of boiler.

The boiler is composed of three main parts; the firebox, the body and the smoke-box. The body is formed or is built upon two cylindrical reservoirs A and B in the drawings attached to each other by three drums for direct connections as well as by the tubes that serve the purpose of water evaporation and circulation. These,  $V_1 V_2$ , are of steel. The upper reservoir holds both water and steam; while the lower one, which ends at the front end of the firebox, is filled with water only.

The firebox extends down to the grates that carry a hollow frame. The crown of the firebox is the upper reservoir A; the front and back walls are of fire brick, and the side walls are formed by the tubes  $V_1$  with expanded joints and connect the upper reservoir with the hollow ring. The latter is further connected with the two reservoirs by large return pipes  $R_1 R_2$ .

The gases of combustion pass between the nests of water tubes that extend from the firebox to the smokebox. In order to avoid an admission of air, steel covering plates have been applied to the sides of the firebox and body of the boiler.

As in the case of the boilers of torpedo boats, the circulation of the water is maintained in such a way that there is an ascending current passing through the tubes immediately surrounding the firebox, and in the principal nests nearest thereto, while the descending current passes through those that are more remote as well as through the return water tubes  $R_1 R_2$  which are not in contact with the flames. While the circulation is quite rapid, the adherent deposits have a tendency to form in the tubes that are the hottest, though they are easily removed when scale is thus formed, as will be shown later. The principal dimensions are as follows:



Cross Sections of Mud-Ring.

Grate length	72 in.
" width	41.34 in.
" area	2.67 sq. ft.
Tubes, 2.6 in. diameter (number)	556
" 1.8 in. diameter (number)	60
" 2.6 in. diameter (average length)	67 in.
" 1.8 in. diameter (average length)	47.8 in.
Heating surface (firebox)	165.67 sq. ft.
" (nests of tubes, reservoirs and drums)	1,108.07 "
" (total)	1,273.74 "
Length of nest of tubes	143.7 in.
Steam pressure per sq. in.	160 lbs.
Total capacity	300 cu. ft.
Volume of water at upper level	248.8 cu. ft.
Volume of water at lower level	206.45 "
Difference available for evaporation	41.35 "
Weight of boiler empty without attachments	29,700 lbs.
Weight of boiler filled	42,570 "
Height, center of gravity of boiler above the rail	7 ft. 5 3/4 in.

The Robert boiler has one advantage over the ordinary locomotive boiler in ease and speed in freeing the scale without taking out or disturbing any part of the structure as must be done in the case of the standard style. When the boiler is to be washed out, it is first emptied and then filled with cold water so as to make it possible to enter the cylindrical reservoirs, which are provided with manholes. There need be no fear of overstraining or distorting any of the parts by this sudden cooling as would be the case with boilers fitted with the ordinary fire tubes.

The reservoirs can always be cleaned without using any special apparatus, as they are always accessible. The tubes are cleaned as follows: The workman takes a piece of flexible shafting into the upper reservoir. This carries cutting teeth at one end and is driven from the shop. The teeth cut away the scale in a few moments and it falls into the lower reservoir or the hollow frame of the firebox, from either of which it is readily removed. All parts of the boiler can be cleaned in the manner thus indicated and kept in such a state of cleanliness that the best condition of evaporative efficiency be maintained.

It is also necessary to free the tubes from the soot that may have accumulated upon them. This can be done by the crew,

even while the engine is on the road, for there are two pipes *o o* connected to the steam pipe *k*, and perforated with small holes inclined in the proper direction. By opening a cock and allowing the steam to blow out at these holes, the surfaces of the tubes are scoured and cleansed of the soot which is blown out at the stack.

The advantages that are claimed in comparison with the ordinary type are: Less weight for the same amount of heating surface, and the entire avoidance of flat surfaces that must be stayed by bolts or braces; ease of cleaning, as no tube joint is exposed to the action of the flames, the liability to leakage from this cause is avoided; the construction and especially the work of repairs being less troublesome than in the case of the ordinary boiler, the time occupied in the making of repairs is shorter, and this lessens the period that the engine is out of service.

The criticism to be made is that, owing to the limited area of the water surface in the upper reservoir the liberation of the steam is likely to be accompanied by a violent ebullition with a consequent intrainment of water.

The engine shown has been in freight service for 16 months. The line has a length of about 74 miles, with an undulating profile in which there are some long 2 per cent. grades. The train loads handled are about 25 per cent. more than those taken by engines with fire-tube boilers, having the same heating surface and practically the same grate area, in the same service. The saving in fuel amounts to about 10 per cent., which is due to the better condition of the evaporating surfaces and the improved circulation of the water.

The maintenance of the boiler, up to the present, has been practically nothing, while, in the case of the ordinary locomotives

found not guilty, and in 76 found guilty. The other 33 cases had not yet come to trial. This the management adduces as evidence that it acted with judgment, and was not unduly severe.

#### Time Freight on the Southern Railway.\*

The revised instructions governing time freight on the Southern went into effect March 1, 1905. Although nominally there is only one class of time freight, including all kinds of perishable freight, all merchandise, carloads or l. c. l., machinery and live stock, and a number of other articles, as a matter of fact perishable goods really constitute a special class within the general class. Special forms shown below are provided for the record of perishable freight and also of merchandise freight in case the latter becomes delayed in transit. Except for these two items the general system corresponds quite closely to those already shown. The forms used are the time freight waybill envelope, the telegraph train report for passing trains, the consist report, the cut-out report, and the two special forms mentioned. Four previous forms in use prior to the revision were abandoned. It is taken for granted that a time freight car is moving uninterruptedly in the train in which it started until form 84, the cut-out report, is received, showing that the car has been cut out. Time freight, except perishable, destined to branch line points is followed to divisional terminal or branch line junction points only, after which it is left to the chief train despatcher, train master and superintendent to see that such cars are forwarded to their destination on the first proper train. For example, a car of time freight billed from Pinners Point to Concord, N. C., is followed by the system only as far as Spencer.

As is generally the case, it is provided that time freight must

6000 4-1-1905-D. Form 184.

**SOUTHERN RAILWAY COMPANY.**

Station A Date B 190  

J. N. SEALE, S. of T., Washington, D. C.

The following cars of Merchandise Freight (PACKAGE CARS) were

C    D   

ready for Train No.    190  , which left

F   

at    M., but were forwarded on other trains as below:

G	H	J	K			M
INITIAL.	NUMBER.	DESTINATION.	TRAIN.	TIME.	DATE.	CAUSE OF DELAY.

This report to be telegraphed to the Superintendent of Transportation immediately cars are forwarded.

#### Report of Merchandise Freight Delayed.

during the same period, it has been necessary to replace a large number of staybolts and tubes as well as tube sheets on account of the bad quality of the water, which contains about 2.8 grains per gallon of solid matter and in some localities the waters are so hard that this proportion rises to 9.2 grains per gallon.

The salts in solution, with the exception of a small quantity of carbonate of lime, are the sulphates of lime and magnesia, which produce very hard and adherent deposits.

The writer of the article in *Le Genie Civil*, M. F. Barbier, is of the opinion that the experience thus far obtained with the Robert boiler seems to indicate that it marks a notable advance in construction.

The Prussian State Railroad management having been criticised because of the very large number of cases where it had notified prosecuting attorneys that employees might be prosecuted criminally, while in only a fraction of such cases were the men actually tried and found guilty, the management explains, that in all cases where an accident has caused loss of life or endangered it, the local railroad authorities notify the local prosecuting attorney, who actually prosecutes only after an investigation is made—something as a motorman is arrested here, when some one has been killed, before there is any evidence that it was any fault of his. In 1903 the Prussian railroad authorities notified 1,147 cases of accident to the prosecuting officers; but in only 155 cases did they, after investigation, ask for prosecution, and in these cases only 93 employees were reported as the guilty persons. Prosecutions were made in 151 cases; in 14 the charge was withdrawn, in 28 the defendant was

1-11-05. 5M. B63504

Form 84

#### SOUTHERN RAILWAY COMPANY. CUT-OUT REPORT.

Mr. J. N. SEALE, Supt. Transportation,  
Washington, D. C.

Date    190  

Following Cars, PACKAGE, TIME or PERISHABLE Freight were Cut Out of TIME FREIGHT Trains:

DESCRIPTION					CUT OUT		CUT OUT OF			FORWARDED		
A	B	C	D	F	G	H	J	K	M	N	O	P
Initial	Number	Contents	From	Destination	Where	Why	Train	Time	Date	Train	Time	Date

Superintendent.

#### INSTRUCTIONS.

1. This Cut-Out Report must be transmitted BY WIRE to the Superintendent of Transportation as soon as cars which have been cut out are forwarded.
2. If cars cut out are delayed over 24 hours before being forwarded, report showing why cut out should be sent promptly, and a separate report showing forwarding should be sent as soon as cars are forwarded.
3. If cars cut out are transferred for any cause, this report should show car into which transfer is made, and give forwarding.

#### Cut-Out Report.

be moved only on certain through trains designated to handle it, except time freight originating at non-waybilling points for this class of freight, and that this freight must be bunched, as far as possible, at district terminals to expedite the movement. In other words, it is the constant aim to assemble at district terminals all the time freight possible in order that carded trains may have as near the full tonnage rating of time freight as possible. When there is not full tonnage of time freight, it is provided that carded trains may be filled out with ordinary freight, care being taken to select the highest class loads and the longest haul in order to enable the time freight train to be handled throughout its full run with the least possible amount of switching and setting out of cars. It is emphasized that each division must inevitably protect the through freight schedule, running a sufficient number of sections to move all the time freight and as much of the long haul business delivered by the connecting division as can economically be done. A sufficient number of short haul loads and empties may be kept at district terminals when necessary to fill out through trains to their proper tonnage rating.

The Southern has, of course, a very important fruit traffic, and this requires some special provision in the time freight system already alluded to in the mention which has been made of the extra classification given perishable freight. It is also provided that bananas and other perishable shipments of eight or more cars may,

\*For previous time freight articles see Sept. 8, Great Northern; Sept. 1, Chicago & North-Western, (Sept. 22, Chicago Freight Terminals); Aug. 25, Atchison, Topeka & Santa Fe, and Boston & Maine; Aug. 18, St. Louis & San Francisco.

when necessary, be run as extras under the time freight classification. When regular messengers accompany bananas and other fruit the names of these messengers are shown on slip bills as well as on the regular waybills covering the shipments, and the messengers are also furnished with term passes or with a banana messenger's ticket as the case may require, to provide for their free transportation on the train carrying the shipment. These messengers have entire control of the ventilation of the cars in their charge and are entitled to call on employees of the company for any help that they may require. When the messengers leave cars which are to go forward without a messenger, the position of the ventilators as they have left them must not be changed except on written instruction from the messenger in charge or on special instruction from the proper officer of the company. The ventilation of all cars not accompanied by messengers must be regulated and operated through to destination in accordance with instruction endorsed on the waybills. In the absence of these endorsements or other instructions the cars will be carried through to destination with the ventilation the same as when received by the Southern Railway from connecting lines. It is specifically provided, however, that all ventilators and side doors in this case must be closed when the temperature falls to 32 deg. Fahr., and that they must be opened as before when it rises above 32 deg. Fruit, vegetables and berries

ing. In case of an accident necessitating the transfer of perishable freight a report is made by wire to the superintendent of transportation, the superintendent and train master of the district and the freight claim agent at Washington, stating the nature and extent of damage to the cars and contents together with a report of the action taken regarding handling and forwarding. When bananas are transferred they are apt to be more or less injured by being bruised which causes them to reach their destination in bad condition, in many cases being decayed and occasioning heavy claims for damage. It is therefore insisted upon that whenever it is possible to do so the cars must be repaired without transfer, and that this class of freight must never be handled in transit when it can possibly be avoided.

For the data used in preparing this article we are indebted to Mr. J. N. Seale, Superintendent of Transportation.

### Alternating Current Electric Locomotives.

The determination of the New York, New Haven & Hartford to use the alternating current in its locomotives for the New York terminal is important. As they come in over the New York Central line these locomotives will necessarily use the direct current, but, without question, their own line will have an over-head trolley system for the single-phase alternating-current series motors.

The contract taken by the Westinghouse Electric & Mfg. Company comprises 15 locomotives for high-speed passenger service, each of which will weigh approximately 78 tons and will be capable of maintaining a schedule speed of 26 miles an hour in local service with a 200-ton train making stops every 2.2 miles and reaching a maximum speed of about 45 miles an hour between stations. In express service a speed of from 60 to 70 miles an hour can be main-

3-22-05-60M-S
Form 16

# SOUTHERN RAILWAY COMPANY.

Division. \_\_\_\_\_ 190

## SUPERINTENDENT OF TRANSPORTATION, WASHINGTON, D. C.:

Below please find correct list of all cars loaded with Vegetables, Fruit, Melons, Meat, Poultry, Eggs, Beer, etc., Received from

\*A
\*B
\*C

TRAIN No.  
or  
Connecting R.R. (Time)

}
M.

190

\*D
\*E
\*F

forwarded by Train No. \_\_\_\_\_ Section No. \_\_\_\_\_ or Delivered \_\_\_\_\_ R. R. \_\_\_\_\_

\*G
\*H
\*I

leaving here at \_\_\_\_\_ o'clock \_\_\_\_\_ M. (date) \_\_\_\_\_ 190

*J Initial	*K Number	*M Contents	*N Final Destination	*O Received at	*Q Explanation of any delay
1					
2					
3					
4					
19					
20					
21					
22					

Agent or Yardmaster. \_\_\_\_\_

### INSTRUCTIONS.

This report to be made up by *Yard Foreman* or *Agent*, and telegraphed to Superintendent of Transportation as soon as train leaves his station. Cipher letter "O" Received at, to show connection received from or local starting point on line of Southern Railway.

Make full explanation of any delay.

If cars are transferred, show Car Number and Initial into which transferred.

Operators will transmit only written portion of this report, and use Cipher Letters for that purpose indicated thus\*.

### Record of Movement of Perishable Freight.

loaded in common or ventilated box cars must be transferred to refrigerator cars when the temperature falls to 10 deg. above zero, and when so transferred, or if loaded in a ventilated refrigerator car with the ventilation closed, the car must be iced sufficiently to prevent heating. When the temperature falls to zero the division officers are instructed to place all cars containing fruits, vegetables and berries in roundhouses or other places of security and do everything possible to protect them.

When these cars are left at junction points for delivery to connecting lines, branches or other divisions, or when they are similarly received, the agents and yard masters at these points are required to take a full record of the position of the ventilator plugs and trap doors, stating what ventilators, if any, are opened or closed or if any are closed and cleated; also, whether or not the train pipes under the refrigerator cars are plugged up and the character of the plug. Finally, the name of the messenger in charge, if there is one, must be recorded. All instructions given by messengers in regard to the ventilation of their cars must be in writing and signed. A continuous accurate record is also kept of the weather conditions and temperature at all junction points.

The diversion of loaded cars in transit is handled through the office of the freight claim agent and the superintendent of transportation is advised promptly of the change in destination or route.

[illegible]

### Telegraphic Train Report.

tained with a train weighing 250 tons. To handle heavier trains two or more locomotives will be coupled together and controlled from the forward cab. The multiple-control system which forms part of the equipment makes it possible for a single engineer or driver to operate several locomotives coupled together just as easily and as accurately as he can handle one, in a manner similar to that with which we are familiar on electrically operated elevated roads where trains made up of many motor driven cars are controlled entirely from the forward car.

One of the important characteristics of Westinghouse single-phase alternating-current series motors is that they will operate successfully when supplied with direct current and may therefore be employed on either the alternating or the direct-current system. It has, accordingly, been possible for the railroad company to adopt this economical system for the operation of its lines and at the same time accommodate its equipment to the direct-current system now being installed by the New York Central. The New York, New Haven & Hartford uses the Central tracks between Woodlawn and the Grand Central Station. For a time the service will be confined to this section. It is therefore with an eye to future rather than to present requirements that the alternating-current system has been adopted. The decision indicates a belief on the part of the railroad engineers that this method offers the real solution of the problem of heavy transportation.

Each locomotive will be equipped with four Westinghouse single-phase railroad motors of the straight series gearless type and with the unit switch system of multiple control. The motors will be permanently connected two in series. On direct current the pairs of motors will be operated in series parallel and on alternating-current by voltage control. The motors will be spring supported and connected by flexible drive in such a way that all dead weight will be taken off the axles. On direct current each motor will be capable of developing a rated output of 400 h.p.

### Chicago Track Elevation.

The report for 1904 of John O'Neill, Track Elevation Expert for the City of Chicago, which has just been made public, contains a grand summary of the ordinances which have been passed by the City Council and accepted by the railroad companies for the elevation of their roadbed and tracks from May 23, 1892, to April 6, 1905, as follows:

Total number of miles of main track to be elevated.....	153.23
" " " miles of all tracks to be elevated.....	746.33
" " " miles of subways to be constructed.....	576
" estimated cost of entire work when completed.....	\$48,910,250

The amount of work completed up to Dec. 31, 1904, is as follows:

Total number of miles of main track elevated .....	82.84
" " " miles of all tracks elevated.....	425.19
" " " miles of subways constructed.....	360
" estimated cost of work done.....	\$28,725,250

The work remaining to be done under ordinances passed and accepted is:

Total number of	mile of main track yet to be elevated.....	70.39
"	" " miles of all tracks yet to be elevated.....	321.14
"	" " miles of subways yet to be constructed.....	216
"	estimated cost of work yet to be completed.....	\$20,185,000

There are two ordinances at present before the City Council which if passed, and accepted by the roads, will bring the grand total of work covered by ordinances to date to \$51,860,250, and work yet to be done amounting to \$23,135,000.

We show herewith a map of the City of Chicago, furnished by courtesy of Mr. O'Neill, which presents in graphic form the track elevation situation. The heavy solid lines show the work already completed, or at present under way, and the heavy broken lines the parts for which ordinances have been accepted but upon which work has not yet begun.

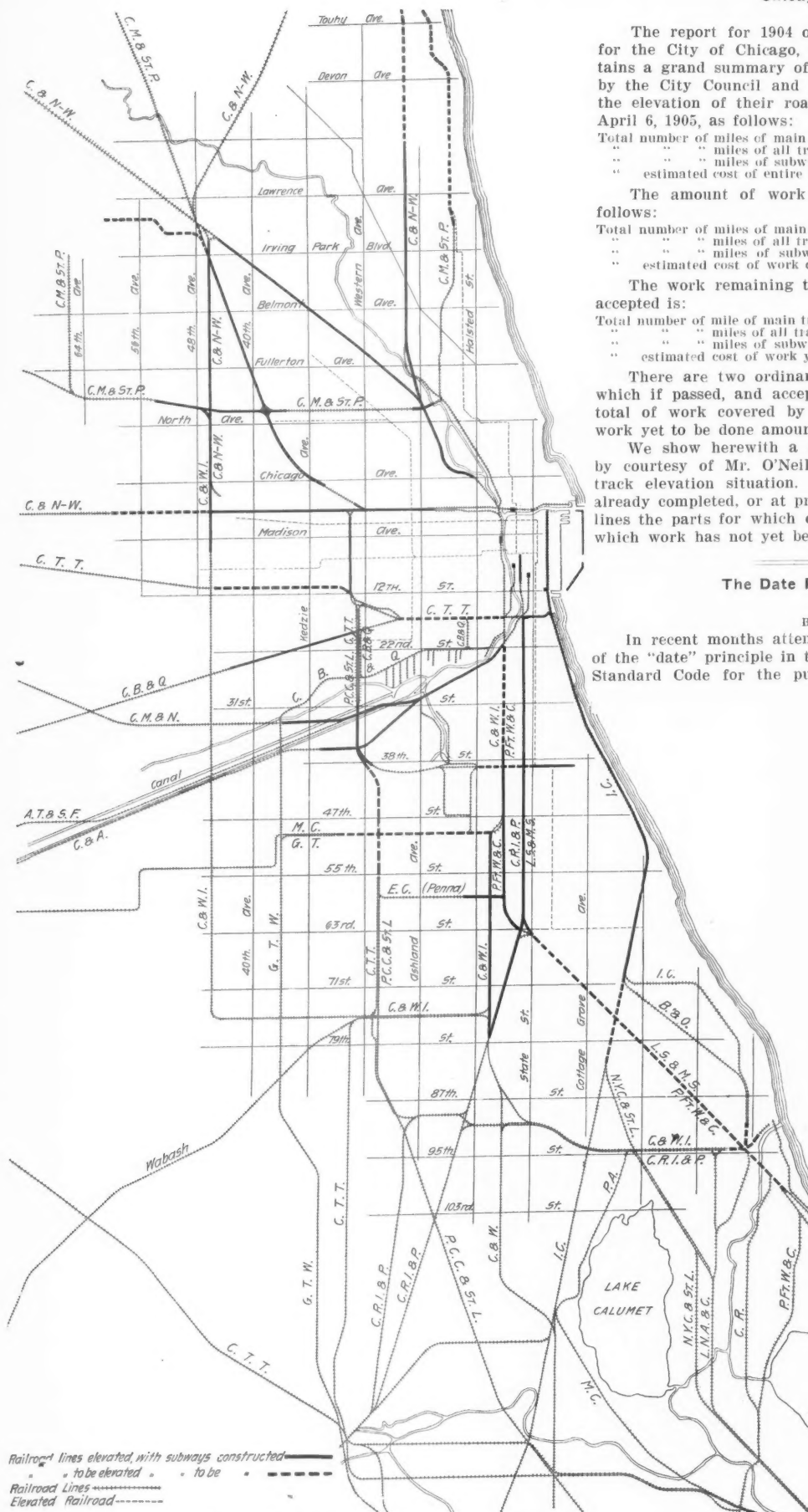
### The Date Principle and Rule 4 B.

BY H. A. DALBY.

In recent months attention has been called to the application of the "date" principle in the operation of Rule 4, Form B, of the Standard Code for the purpose of determining beyond question

whether or not a particular schedule is in effect after a change of time-table and what trains may or may not assume that schedule. To any one who has made a study along this line the necessity for some such determining factor is so apparent that no argument is required for its support. The fact that almost every road, whether using the Standard Code or not, employs the principle of Rule 4B seems sufficient evidence that it is considered the most advantageous for the government of trains at such a time. The principle is that the authority of a schedule that is in effect when there is a change of time-table shall be transferred to a corresponding schedule of the new time-table, the train or trains that were using the old being instructed to proceed to their destination on the new. The principle is good but in the present rule *only* the principle is established. In many cases the schedule on the new time-table can be made to supersede the corresponding one on the old without confusion, but in others serious questions have arisen and not a few instances have been pointed out in which it is entirely possible for two trains to assume the same schedule while following the instructions in the rule. To overcome this defect the "date" principle has been adopted as the official understanding on a few roads.

The weakness of the present rule can best be explained by referring to a change of time-table which took place on a western road something more than a year ago. The schedules given are



**Map of Chicago Showing Track Elevation Work.**

abbreviated but are essentially correct. The train is No. 1, daily, on both time-tables.

	Old.	New.
Leave A .....	12:01 a. m.	10:30 p. m.
" B .....	1:15 "	12:30 a. m.
" C .....	2:30 "	1:30 a. m.
" D .....	3:45 p. m.	12:30 p. m.
Arrive E .....	3:30 p. m.	1:30 p. m.

The time-table took effect at 2 a. m. April 10. No. 1 left A on time the 10th and was ready to leave B at 2.15 a. m. The question arose whether it should consider itself one hour and 45 minutes late and proceed or should wait 22 hours and 15 minutes and proceed on time. Many would reply without hesitation that it should proceed, being one hour and 45 minutes late, and, indeed, this would seem to be authorized by the rule. But suppose the train which left A at 12.01 the morning of the 9th was 11 hours and 45 minutes late at D and was overtaken by the new time-table at that station. What would it do? There is only one thing it could do; wait until 12.30 p. m. and proceed on time. But the train at B has already assumed that schedule. Which one is right? Both have done precisely as the rule directed.

It hardly seems worth while to put the question, "Is No. 1 due to leave A at 10.30 p. m. the 10th?" for the reply may be anticipated, "Certainly. Why not?" Well, there is nothing in Rule 4 (B) that forbids it, neither is there anything that will answer any of the above questions. It has been customary to say that the superintendent should arrange for such circumstances and say which schedules are in effect and which are not. This is equivalent to saying that it is his business to interfere to keep trains from getting together. If a blizzard should take the wires for a day or two about that time his instructions might be a little late arriving.

The "date" principle, when applied, establishes two important governing facts. First: The train in assuming the schedule of the corresponding number on the new time-table must assume the schedule of the same date as the one it has been using. Second: Not more than one schedule of the same number can be in effect at the initial point on one day. With this understanding, the train at D, having been the train of the 9th, continues to use the schedule of the 9th and was due to leave D at 12.30 p. m. the 10th. The train at B had been using the schedule of the 10th and should have continued to use the schedule of the same date on the new time-table which would make it due to leave B at 12.30 a. m. the 11th. At the initial point, A, a train has already left at 12.01 a. m. the 10th, therefore another train cannot be due to leave A until the 11th at 10.30 p. m. For a daily schedule, according to this interpretation, No. 1 is due to leave A once every day and only once, no matter how many time-tables may be in effect.

An aid to the understanding of this plan may be found in the following suggestions: In considering the status of a train which happens to be on the road at the time of change, determine first whether its schedule has a corresponding number on the new time-table. If it has, keep in mind the date the train was due to leave its initial point. These facts being settled, cut loose from the old time-table entirely, and, to use a popular expression, "forget it." The new time-table has completely superseded the old. There is only one time-table in existence, the new one. The two facts being determined, the train knows its place on the new time-table. To all intents and purposes the time-table has been in effect for years. This applies not only to the schedule used by the train in question, but the validity of all other schedules are determined in the same way.

For schedules extending between the same initial and terminal stations and that are otherwise similar this principle seems to be an infallible guide to all trains concerned at such a time. It would not solve all the grievous questions, however, if the two words "and date" were inserted in the present rule so as to make it read, "A train of the preceding time-table shall retain its train orders and take the schedule of the train of the same number and date on the new time-table." There are possible combinations by the score which would produce questions just as unanswerable as those that have puzzled us for years. The initial point or the terminal, or both, may be changed by the new time-table. It would not be an unheard of occurrence if the directions for odd and even numbers were reversed. These possibilities seem to make it impracticable to try to construct a rule by which every train, no matter under what conditions, may assume the schedule of the corresponding number on the new time-table, therefore the application of the principle is restricted in the rule proposed by the writer of this article to schedules extending between the same stations on both time-tables. When the schedules are not thus similar the old one dies with the old time-table and the one on the new time-table does not become effective until its leaving time after the time-table has taken effect. In the greater number of cases the schedules come within the required conditions so that the principle of the rule may be used. In the few instances where the schedules are dissimilar, while it may occasionally happen that a train on the road may find itself without a schedule to complete its run, there will be the safe condition that all concerned will understand alike.

In presenting a proposed substitute for Rule 4 (B) it will be necessary to explain the displacement of the word "train" and the substitution of "schedule" therefor. In many of the Standard Code rules the word "train" is used when a schedule is meant. Rule 4 (B) refers to a schedule, not a train. It affects a column on the time-table and there may be no train in the case. The train may not yet have left the initial station. There may be no intention of running a train at all. But the schedule is there and it is the life or death of the schedule that Rule 4 (B) is intended to determine. Our proposed rule is as follows:

4 (B). Each time-table, from the moment it takes effect, supersedes the preceding time-table. When a schedule of the preceding time-table corresponds in number, direction and initial and terminal stations to a schedule of the new time-table, its existence and authority, with every condition pertaining thereto, will be transferred to the schedule of the same number and date on the new time-table. A schedule of the new time-table which does not correspond in number, direction and initial and terminal stations to a schedule on the preceding time-table shall not be in effect on any district until its leaving time at its initial station on that district after the time-table takes effect.

Schedules on each district date from their initial stations on such district.

Not more than one schedule of the same number and date shall be in effect on one district.

It is intended that the words, "its existence and authority, with every condition pertaining thereto," shall be taken in the most literal sense. If a train has been running on the old schedule it is authorized to continue on the new. If the old schedule has been partially fulfilled, that much of the new one has also been fulfilled. If a train is running late on the old it continues to run late on the new. If the old has been annulled the new one is also annulled. Whatever is said of the old must also be said of the new.

The writer wishes to explain that the "date" principle was brought to his notice after the manuscript for his book, "Train Rules and Train Despatching," had been completed, else his treatment of this subject would have been different. The principle immediately commended itself to him as a solid foundation upon which to build an infallible Rule 4 (B). He applied himself to the task with the above result, and he offers it for the approval or disapproval of those who may feel the necessity of a change.

#### Pennsylvania Railroad Baggage Checks.

The Pennsylvania Railroad has adopted a new design of card or tag baggage check, a sample of which is shown herewith. This check is, we understand, the design of Messrs. G. W. Conrad and W. J. Fidler, of Pittsburg, and a patent has been applied for. The illustration shows a local check two-thirds size. The check for use in sending baggage to other roads is made a little longer, to allow room for writing in the route, and is printed in blue instead of black. On all checks the numbers are printed in red. The novel features of the check are the hyphens in the numbers, and the use of punch marks to indicate the kind and condition of the baggage. It is believed that with the hyphens, numbers will be much more easily and rapidly read, and that in reading, there will therefore be fewer errors. If a piece of baggage is in bad order, it is believed that the punch mark, indicating to the passenger that the defective condition has been noted, will be a sufficient safeguard against unreasonable claims and will make it unnecessary to secure written releases from passengers. The inventors, in their circular, claim that this check will obviate the necessity of entering a description of the baggage on the waybills carried by the train baggage master. This would seem to be only partially

true, as it is often very convenient to know not only whether it is a trunk or a valise that is being looked for, but also what kind of a trunk or valise; that is to say, it would seem desirable to have, as many roads do have, six or more (abbreviated) terms for describing baggage instead of only two. It is claimed also that the check will

(NOT APPLIED TO)

LOCAL TAG CHECK

PENNSYLVANIA R. R. CO.

From \_\_\_\_\_

To \_\_\_\_\_

Via \_\_\_\_\_

P. R. R. SERIES B

**34-85-92**

Description and condition of baggage when checked as indicated by PUNCH MARKS

TRUNK. VALISE. BAD ORDER FRAGILE.

LOCAL ☐ DUPLICATE CHECK

PENNSYLVANIA R. R. CO.

From \_\_\_\_\_

To \_\_\_\_\_

P. R. R. SERIES B

**34-85-92**

prevent fraud, as it will hinder sneak thieves from changing strap checks from worthless valises to valuable trunks.

#### Reinforced Concrete Trestle for the Illinois Central.

The Illinois Central has been building reinforced concrete trestles for several years, but the design used up to the present time has made use of old rails for the reinforcing metal. A new design has lately been prepared which accords more nearly with theoretical principles, and two single-track trestles are being built at the present time from these plans, both being on the St. Louis-Carbondale line. The trestle illustrated herewith is of typical design, and is located near New Athens, Ill., and has five panels. It is an elliptical arch design, each arch being a full half ellipse. The span is 14 ft. in the clear and the piers are 3 ft. wide, the distance from center to center of arch crown being therefore 17 ft. The piers and abutments rest on a natural gravel foundation, the former being spread at their bases to a width of 8 ft. and a length of 19 ft. The resulting load is about  $1\frac{1}{2}$  tons per sq. ft. Where the soil conditions require, a pile foundation is used.

Reinforcing is by means of  $\frac{3}{4}$ -in. Johnson corrugated steel bars throughout, the arrangement and spacing of which are clearly shown by the drawings. The cross-section shows the arch to be 16 in. thick at the crown and a parapet on each side of the trestle 18 in. high and 18 in. wide at the top. The width between parapets is 12 ft. and over all is 15 ft. The extrados of the arch is at sub-grade level at the crown. The drop each way is slight but sufficient to drain thoroughly, and 4-in. tile drain pipes are placed on each side of the trestle at the low points, which are, of course, directly on the pier center lines. The entire structure, both inside and out, will be finished with a mortar composed of one part of cement and two of sand, which is the standard finish of the road for cement structures.

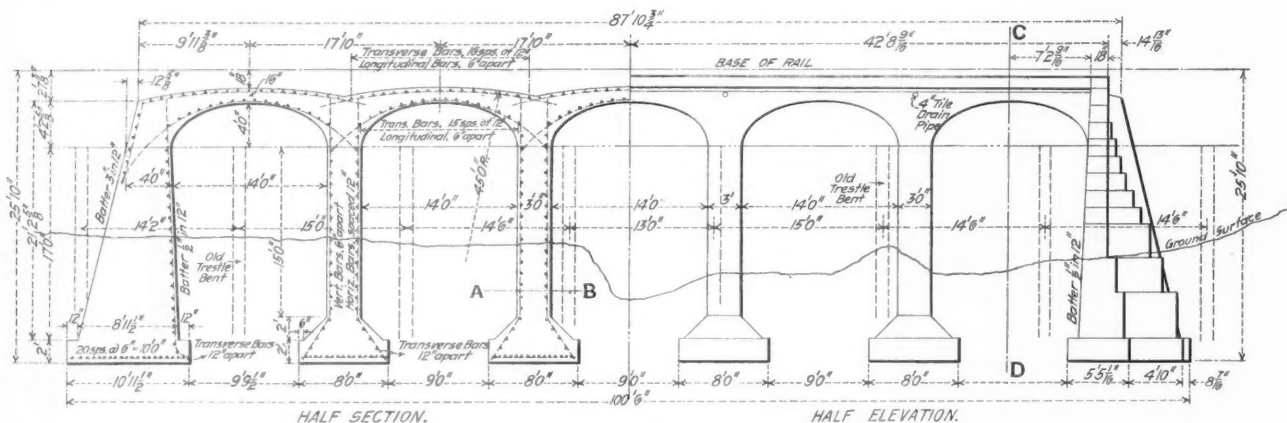
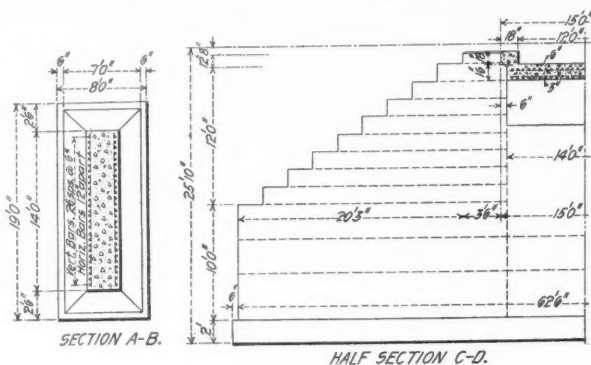
which should be under conditions as similar as practicable to those of actual work.

No matter how carefully a boiler may be designed and constructed, there will still be a doubt as to its actual strength, since the material may have sustained injuries in the process of construction which may have escaped detection.

Many cases of dangerous defects which the strictest scrutiny of the complete boiler would fail to detect have been brought to light by the hydrostatic test combined with careful inspection.

This is especially true where there has been a cutting out of the holes in order to insert rivets, a reckless use of the drift, or improper bracing that is so covered that it cannot be seen.

The locomotive boiler does not admit of anything like proper examination. The expense of removing the tubes alone would forbid a periodical examination of the shell of boiler, and the water spaces around firebox are almost entirely out of sight, consequently



Reinforced Concrete Trestle—Illinois Central.

The concrete trestle replaces an old wooden structure and the work is being done without interfering with traffic. The broken lines show the position of the bents of the present trestle, which has been raised so as to allow the stringers to clear the concrete about a foot. One bent of the wooden trestle conflicts with a concrete pier and will have to be removed. This design will be the standard on the road for the replacement of long wooden trestles, as it furnishes an economical permanent construction. The two trestles being built now are over streams which only have water in them after heavy or protracted rains. A 1:2:5 mixture is used mostly and the cost is about \$6 a yard, or about \$7,500 for the New Athens trestle. It is expected that the two trestles now building will be completed about November 1. The design was worked up by H. H. Hadsall, Assistant Engineer of Bridges, under the supervision of R. E. Gaut, Engineer of Bridges, to whom we are indebted for the data. The Widell-Finley Company, Chicago, has the contract.

#### Hydrostatic Tests of Locomotive Boilers.\*

Since it is impossible to separate hydrostatic tests and inspection, the two should be considered together. The object of the test is to ascertain if the boiler is capable of sustaining some given pressure, and also to test the joints as well as the quality of workmanship.

The only means we have of ascertaining with any degree of certainty the safety of a boiler is by the application of pressure,

a thorough examination is out of the question. In all cases there is only one means of testing the strength of the boiler, and that is—the application of pressure.

We would not consider it practicable to allow a boiler to go through any of our shops for general repairs without having a hydrostatic test, this test to be applied before the boiler is covered so that any defects that may be found through said test may be properly taken care of.

When we consider that a locomotive boiler is constructed with a factor of safety of between 4 and 5, it would be impossible to injure the boiler in any way testing it at a pressure of 25 or even 50 per cent. above its rated working pressure.

The laws of the State of Massachusetts on inspection and testing locomotive boilers give the following, adopted June 1, 1901, by the Board of Railroad Commissioners under the provisions of Chapter III, Section 218, Revised Laws:

1. All boilers for locomotives before going into service must be subjected to a hydraulic pressure of not less than 25 lbs. per sq. in. in excess of the maximum amount to be carried when in service, and in no case less than 150 lbs. per sq. in.

2. The water must be heated to near the boiling point.

3. This test must be repeated at least once a year.

4. The Superintendent of Motive Power, Master Mechanic or some other proper agent of the company will attend in person. He will remain outside while an assistant will examine the firebox from the inside.

5. A record of all tests must be made, giving dates and anything worthy of mention, and a report of the same must be made to the Board on or before the first day of February annually, covering the preceding calendar year.

\*Abstract of a paper read before the Central Railway Club, Sept. 8, 1905, by George Wagstaff.

6. Special examinations of the stay-bolts of locomotives in service must be made not less frequently than once in three months.

7. When these examinations are made, all the water must be drawn from the boiler, so that the vibration of the sheet may indicate any unsoundness of the stay-bolt when it is struck with a hammer. When stay-bolts are drilled this test may be omitted.

8. All stay-bolts applied after this date, with the exception of crown sheet bolts and bolts behind frames, must be drilled from the outside one and one-fourth of an inch deep and three-sixteenths of an inch in diameter.

9. No locomotive shall continue in service with a broken stay-bolt in the top row, or with two or more broken bolts contiguous in any part of the firebox.

10. Steam gages must be tested immediately before hydraulic pressure is applied, and must be tested at least once in three months thereafter.

11. These regulations supersede all regulations heretofore made by the Board.

The large percentage of dangerous defects found each year by the inspection of boiler insurance companies goes far to prove the necessity of a periodical test. From the reports issued by one company it appears that, in the year 1904, out of 152,282 defects discovered, 13,390 were dangerous.

That the hydrostatic test is very convenient method of testing the tightness of the work on a new boiler cannot be gainsaid, and as a detector of leakages it has at least no rival, and its application enables faulty caulking to be made good before the boiler has left the works, and before a leak has time to enter on its insidious career of corrosion. It will be evident that, if the test be applied with this object to a new boiler, the pressure should

New York & Jersey Railroad Company was incorporated to take over and complete the work. Two tunnels were to be made, to accommodate light narrow gage electric trains. The tunnels were to connect at grade with surface lines at Thirteenth and Henderson streets, Jersey City, and Christopher and Tenth streets, New York. The north tunnel was driven through in March, 1904, the south tunnel being then about half completed.

In March, 1903, the Hudson & Manhattan Railroad Company was incorporated to build two single-track tunnels from Cortlandt street, New York, to Exchange Place, Jersey City. In January, 1905, the Hudson Companies was incorporated to merge the control of the New York & Jersey and the Hudson and Manhattan companies. Work on the last named tunnel was begun a few weeks ago. In 1899, three other companies were incorporated, but nothing has since been heard of them. The Pennsylvania tunnel at Thirty-fourth street is familiar to the reader.

The Hudson Company proposes to extend its lines (underground) in Manhattan from Christopher street northward to Thirty-third street and Sixth avenue. The "Interstate Tunnel" Company proposes to run cars through and over the surface lines both in Manhattan and on the New Jersey side.

### Use of Superheaters on the Locomotives of the Belgian State Railways.

The Belgian State Railways have recently brought out three new types of locomotives. These are all six-connected; one, for heavy passenger service, with inside compound cylinders and piston valves; the second, a four-cylinder compound, and the third a

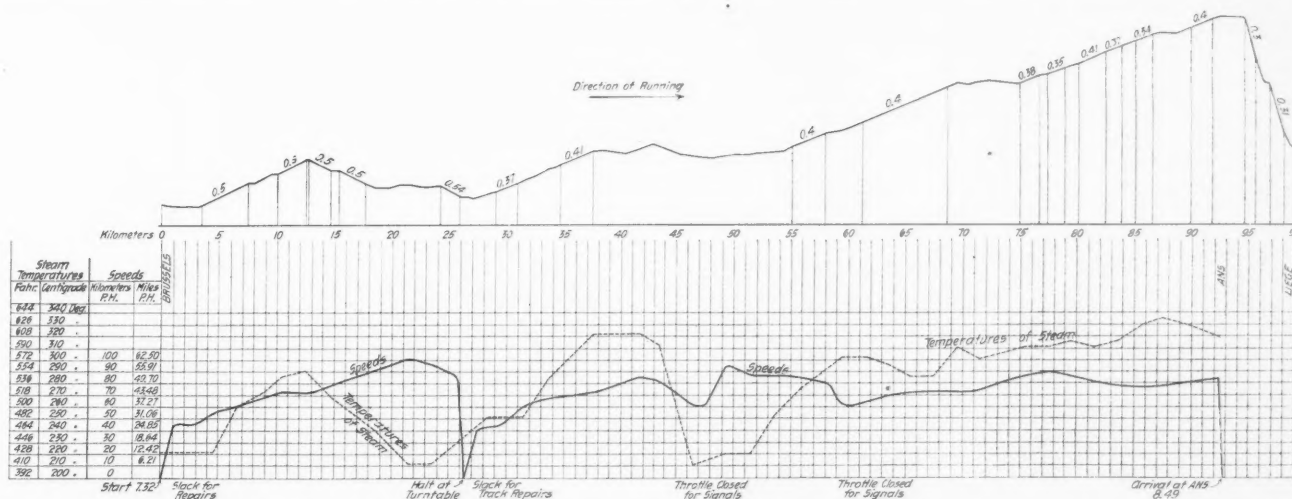


Diagram- Showing Data of Run With a Four-Cylinder Single Expansion Engine Equipped With Superheater—Belgian State Railroads.

range to some point in excess of the working load if such a test is to be of any practical value.

While these arguments have been made to apply to new work it is evident that, if they are valid for this, they apply equally well to the periodical testing of locomotive boilers in service, and the conclusion may be drawn that there should be such a test once a year in which a pressure at least 25 per cent. above that under which the engine is to be worked should be applied.

### Tunnels Under the Hudson.

There was incorporated last week in New York and New Jersey the Interstate Tunnel Railway Company, to build a tunnel under the Hudson River from New York City to Erie and Thirteenth streets, Jersey City. The proposed New York terminus is at Chambers street and Park Row, east of Broadway. The purpose of this tunnel is to connect the lines of the Metropolitan Street (surface) Railway, Manhattan, with the trolley lines in northern New Jersey controlled by the Public Service Corporation, and these two interests will finance the project. Work will be begun, it is said, as soon as the necessary rights have been granted by the public authorities, and these have been applied for.

Of the half dozen projects for tunneling under the North River, those now alive are controlled by three companies. The first was started in 1874, by the Hudson River Tunnel Company, on the line from Henderson street, Jersey City, to Christopher street, New York. Work was begun and was continued spasmodically, being stopped several times by accidents and lack of funds, until 1892, when the works were abandoned and the completed portion, about 4,000 feet of the total 5,200 feet, was allowed to fill with water. In 1899, the property was sold at a receiver's sale, and in 1902, the

four-cylinder single expansion. Superheaters have been applied to all of these engines, designed for both passenger and freight service. In addition to these a number of de Glehn compounds have been purchased.

Up to the present, however, no data is available regarding performances either in the matter of capacity, maintenance or fuel economy, and will not be for some time to come. It is expected that when the final results are worked out between the four-cylinder compound and single expansion engines, they will decide as to the value of superheating with and without compounding.

The accompanying diagram is an interesting method of presenting the data of a run from Brussels to Liege with a four-cylinder single expansion engine of the type named. The train consisted of 13 six-wheeled and one eight-wheeled car having a total weight of 327.5 tons, to which 118.5 tons must be added for the engine itself, making a grand total of 446 metric tons, or a little more than 490 tons of 2,000 lbs. It is evident from the diagram that the amount of superheat fluctuated between wide limits and is apparently dependent neither upon the grade nor the speed, but upon other matters the details of which are not at hand. For that reason it would be well if the chart could be supplemented with diagrams of the steam pressure and the horse-power developed.

The run is one of 58 miles, of which 41 are on adverse grades varying from .35 to .50 per cent., so that it is well adapted to bring out the pulling capacity of a locomotive. The highest speed was attained at kilometer 77 on a rising grade of .35 per cent. Speed is not, however, the best measure of what a locomotive is doing, as a portion of it may be traceable to the effect of a previous descent. A fair example of this is shown at kilometer 21, where the speed was 62.5 miles per hour, while the moderator

dampers being closed at the same time, the steam temperature was only 210 deg. C., or 410 deg. F.

The practical demonstration of the value of superheating occurred after kilometer 51, where the driver opened the damper in order to ascend the continuous grades between kilometers 54 and 92. The lowest speed on this long rise occurred on a grade of .50 per cent., and as this was 49.3 miles per hour the work done may be considered as excellent.

The engine from which this data was obtained was built at La Meuse, and was fitted with a Schmidt superheater. The principal dimensions of the machine are as follows:

Driving wheels, diameter .....	78 in.
Cylinders, diameter .....	17 1/2 in.
Piston, stroke .....	24 in.
Steam pressure .....	227.8 lbs.
Type of valve gear .....	Walschaert
Grafe area .....	33.36 sq. ft.
Heating surface, firebox .....	181.52 "
" " tubes .....	1,490.54 "
" " total .....	1,672.06 "
" " superheater .....	389.3 "

#### Efficiency of Large Gas Engines.\*

We are frequently asked, "What is the overload capacity of your gas engine?" A clear understanding on the part of the purchaser of the limitations in this direction is very desirable, from the point of view both of the buyer and the seller. A gas engine and producer is thermally very much more efficient than a steam engine and boiler. It is, perhaps, not amiss to say that, with a well designed producer and gas engine plant, a horse-power can be delivered with one-half the cost of fuel that is possible with a well designed steam engine plant. The power of the gas engine, however, is limited by the total volume of explosive mixture which can be drawn into the cylinders during the suction stroke, compressed and finally ignited. This condition sets a limit which does not allow of a large temporary increase of the power, such as obtained with the Westinghouse steam turbine by the automatic operation of the secondary admission valve. Such overload capacity is, of course, convenient for the purchaser, but it is unobtainable on a gas engine, unless the engine is largely under-rated, and the purchaser should consider that this is one of the prices that he pays for the enormously increased output obtained with the gas engine per pound of coal. *The overload capacity is, therefore, simply the amount which the builder rates his machine below its ultimate capacity.* It has been our practice to rate our gas engines in such a way that they would have a safe overload capacity of 10 per cent. Our machines are ordinarily good for somewhat more than this, but conservative engineering requires that there be a margin of power in order that overloads may not materially reduce the speed. The above remarks on overload furnish a general guide which may be of service in selecting suitable generator capacity for a gas engine. For ordinary cases the overload capacity of the generator and that of the gas engine should be about equal, although the gas engine will indefinitely carry its overload while the generator will not, in all cases, unless it is bought with that understanding.

The mechanical efficiency of a large gas engine is very much greater with a four-stroke cycle than with a two-stroke cycle, this being one of the arguments against the two-cycle engine. It is no uncommon thing to see two-cycle engines which do not realize as brake horse power more than 60 per cent. of the work actually done by the combustion in the cylinders. The efficiency of a four-cycle engine varies considerably, but it may be said in a general way that a well designed engine will deliver about 85 per cent. of the gas indicated horse power in the form of brake horse power. This 15 per cent. of power lost is not exclusively composed of frictional resistance of journals, crossheads, slides, etc., as is the case in a steam engine. The four-cycle engine has, of course, to draw in its own mixture of air and gas and compress the same, and its functions, therefore, combine those of a pump, a compressor and a motor. It is the pumping and compressing work which causes the mechanical efficiency of the gas engine to be somewhat lower than that of a steam engine. The actual friction of the working parts need be no greater than with a well constructed Corliss engine, viz., 90-95 per cent. In order to keep down the friction and increase the reliability of the machines, it is the practice of the Westinghouse company to design large gas engines with provisions for attaching a continuous return oiling system. The large amount of oil put through the journals increases the safety, requires less attendance and keying up, and washes out dust if the engine is required to operate in an atmosphere which is not clean.

The thermodynamic efficiency of the gas engine varies so much with different kinds of gas that it is hard to say just what the average value would be. It is probably not far from the truth, however, that its thermal efficiency is about 25 per cent., though

in favorable cases gas engines have obtained efficiencies well over 30 per cent.

There is an impression rather prevalent that a gas engine is uncertain and hard to start. A properly designed engine, supplied with fairly decent gas, can be started as easily as a steam engine. Large Westinghouse horizontal gas engines are started by means of compressed air, the only operations required being, (1) open the main gas valve; (2) close the igniter circuit; (3) open one compressed air valve, similar in construction to an engine throttle. The compressed air puts the engine in motion, which draws the charge into the cylinders and compresses the same, after which the first explosion takes place. Air is shut off and the engine is in full operation. We find no more difficulty in starting our gas engines than a steam engine of comparative size. I desire to lay stress on this point, as one of the stock arguments against the gas engine is that it is difficult to get into operation.

With certain kinds of gas, inspection of the interior parts of the cylinders is often desirable at regular intervals of, say, a couple of months. This is especially the case with blast furnace gas, and also with producer gas made from certain kinds of fuel.

#### The Making and Repairing of Locomotive Frames.\*

The conditions which confront us with the repairing of locomotive frames have changed so in the last ten years that we now have difficult problems to solve in order to keep abreast of the new conditions. A few years ago the wrought iron frames that have done work so well for half a century were universally in evidence. The failure of these was of rare occurrence, and was easily repaired in the blacksmith shop. To-day we have the low carbon cast-steel frame with all its imperfections. And another innovation is the welding of broken frames on the engine with oil for fuel, or with aluminum thermit.

Evidently the steel frame will be the frame for the future, for the reason that it can be produced much cheaper than wrought-iron forged frames. Future developments may bring the steel frame to such a standard that it will resist the strain to which it is subjected as well as the forged wrought-iron frame. From my point of view and the many failures that have come to my notice in the past two years, the steel frame has not yet reached the standard that the wrought-iron frame has. Many of the steel frames break at the intersection of the pedestal to the back bone of the frame where the main driving axle is located. As this failure often takes place with our largest engine frame, it is evident that the severest strain is located at this point, consequently it cannot be expected that an ordinary weld at this point will be stronger than the original solid material. When a broken steel frame is placed in the blacksmith shop, the best method practical to strengthen this portion of the frame should be adopted, regardless of extra expense. The method adopted in the Southern Pacific shops is to forge a new piece of the best quality of iron and cut out the defective portion; weld in a new "T" piece with the fiber flowing in the direction of the strain to which this portion is subjected. By this method we have to make three welds. This may look like a roundabout way of repairing the fracture. The object of this is to get a sound piece of iron at the point where failures continually occur in the steel frame. The method adopted for welding the new piece into the steel frame is first to weld a piece of iron about an inch thick on to the different ends of the frame at the proper angle to receive the V-shaped piece, the new piece firmly fastened in place with straps bolted together. By this method we have for our main welds iron to iron to receive the V-shaped piece.

Recently we have been changing many of our compound locomotives to straight engines. To accomplish this it became necessary to lengthen the front end of the steel frames as shown in Fig. 1. The following method is used at the Sacramento shops to produce the new iron portion. First, the part C, Fig. 1, is produced by lap-welding a T piece, one-half the thickness required, then laying two of these T pieces together as shown at B. They are welded together under a steam hammer after being heated in a reverberatory furnace, producing the shape shown at C, in which the fiber flows in the same direction as the strains. The upper portion of the frame shown at D is made from solid material and with a side projection, which measures about 5 in. The parts C and D are then welded together to produce the forward portion of the wrought-iron frame as shown at E, Fig. 1. This new end is then welded on to the steel portion of the frame as shown in Fig. 2.

When preparing the steel end of the frame for the final weld, a piece of iron is welded on about 1 in. thick as shown at E, Fig. 2. This method leaves the two ends of the frame to be welded of the same material and shaped to receive the pieces G and F. The V piece, F, is welded in the cavity for the pur-

\*Abstract of paper read before the American Street Railway Association by Mr. Arthur West.

\*From a paper read by S. Uren before the Cleveland meeting of the National Railroad Blacksmiths' Association, August, 1905.

pose of insuring a perfect weld in the center of the bar. The piece G is made with an angle of about 110 deg., and when welded into the cavity under the steam hammer is almost equivalent to a lap weld. On our system 40 of these iron to steel frames have been in service a year. Only one has come to the shop broken at the weld. I am under the impression that this break was caused by the steel frame breaking on the opposite side as no sign of the weld presented itself in the fracture.

The welding of frames with oil, without removing the same from the engine, has caused me to become somewhat skeptical, as well as many of our members, regarding this method. After reading the report of the committee on this subject, I must concede they have done well; however, it is remarkable that all of the welds noted in the reports which have been by this method, there has been only one failure. Great claims are made by some of our California shops for this method of repairing frames. I know of several cases of frames welded by this method that have not run ten miles before the welds parted. The engine returned to the shops, the frames removed and properly welded in the blacksmith shop. Certainly a good welding heat can be produced by this method in members of frames that are accessible; however, I am opposed to butt welding or any other method of

with a collar projecting on each side of the fracture any dimensions we may desire.

The first experiment in the Sacramento shops of mending a frame with thermit was tried April 14, 1905, on engine No. 287, the longest engine on the system. The frame was broken at the junction of the pedestal to the back as shown at A, in Fig. 3. The first preparation made to repair the frame was to drill a series of  $\frac{5}{8}$  in. holes through the broken section as shown. The holes being drilled at right angles to each other, produced a number of small facing projections. The ends of these projections were cut off so as to leave a  $\frac{3}{8}$  in. opening. A jackscrew was then placed between the pedestal, spreading the crack  $\frac{1}{8}$  in. A wooden pattern was made. This had the same contour as the portion of the frame to be repaired, and had such projections on it as were required to produce the reinforcement desired. Eleven ounces of thermit were placed in the crucible for every cubic inch of space in the mould. The space in the mould for the reinforced portion as well as for the parts to be welded were included in determining the amount of thermit to be used. Before igniting the thermit the ends of the parts to be welded should be warmed with an oil burner. A collar  $\frac{3}{4}$  in. thick, as shown at B, Fig. 3, was left around the broken section. This welded frame has been in

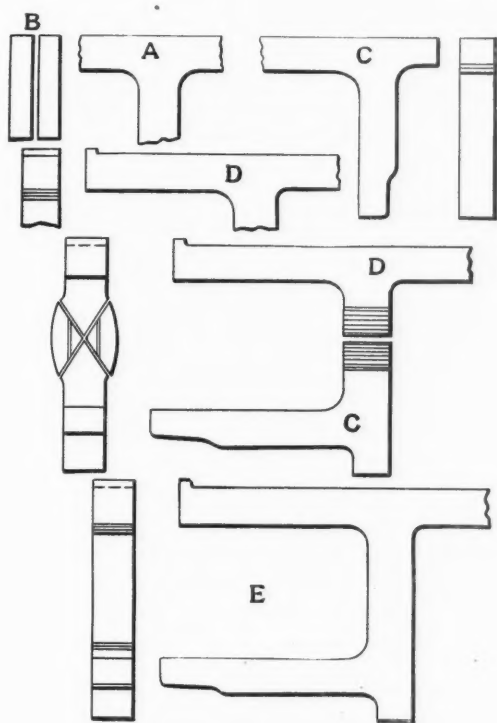


Fig. 1.

Repairing Locomotive Frames.

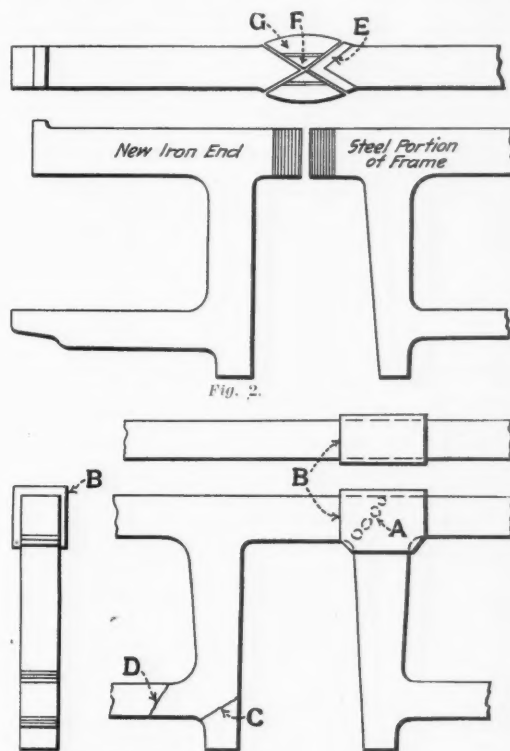


Fig. 2.

Fig. 3.

welding in the blacksmith shop, after the iron is brought to a welding heat, without the proper lamination.

Iron, when brought to a high heat, becomes disintegrated. The molecular structure is impaired and lamination is the only method that will produce the original structure. In my opinion the same conditions exist in welding frames on the engine where lamination is impracticable. I coincide with the views of Mr. McCaslin. If the metal has to be brought to a welding heat, the proper place is on the anvil. If a first class weld can be made on a steel or iron frame by this method, the same method would be applicable to other members of the locomotive. I do not think there is a member of this convention who would attempt to weld a main or side rod of an engine by this method.

Another innovation in the art of blacksmithing is the repairing of frames on the engine by the Thermit method. This, above all other methods, is the simplest and quickest, and from my point of view is the best. Forge, anvil and steam hammer excepted. At the present time the Thermit method is in its experimental stages; it does not require an experienced smith to repair a frame on the engine by this process. The most particular part of making the preparations for the weld is the making of the mold to fit perfectly around the part of the frame to be welded. This is usually done by a moulder. The moulds should be made in halves and bolted together, so that all joints are perfectly tight. By this method of repairing we not only form a perfect union of the broken sections but we can also reinforce the weak points

service up to the present time without showing the slightest defect, and eight welds have since been made by this process and not one of these has failed.

#### Early Railroad Construction in New South Wales.\*

BY JOSEPH BRADY, M. INST. C. E.

Railroad construction in Australia was commenced late in 1850, by the Sydney Railway Company, of which Mr. Charles Cowper was the first Chairman and Mr. F. W. W. Shields, M. Inst. C.E., the first Engineer. At that time all the goods and passenger-traffic of the interior passed over the highway between Sydney and Paramatta, a distance of about 14 miles, passengers and mails being carried by stage-coaches, and goods by bullock-teams, and it was thought that there were fair prospects of a railroad between the two places paying good dividends on the capital required for its construction. The scale of wages was low, laborers being paid about 2s. 6d. per day of 10 hours, and tradesmen, including mechanics, about 5s. per day. There was therefore good reason for assuming that the line could be completed at a moderate cost.

The preliminary and working surveys were completed in the latter part of 1850, and one small contract for earthwork and bridge-construction was let to a local builder early in 1851, and was carried

\*Reprinted from the *Proceedings of the Institution of Civil Engineers*, Vol. CLIX.

on at a very slow rate. There were no railroad men in the country at the time and no railroad plant of any description. Mr. Shields had only a small staff of assistants, comprising one mechanical engineer, one surveyor, and the author, who had recently arrived from England. In February, 1851, Mr. Shields resigned his position as Engineer to the company, and Mr. H. C. Mais, M. Inst. C.E., was appointed in his place. In November of the same year the author commenced work on a special survey for railroad extension towards Goulburn; this survey was finished as far as Mittagong, over rough country, in February, 1852. An alternative loop-line was then marked over the Razorback range, through the town of Camden, and in April the survey was finished and camp was broken up. The length marked out was 58 miles. The contingent office work was completed and the plans and report were submitted to the directors and adopted by them in June. The author was then appointed Acting Engineer in charge of the works of construction in progress. About this time Mr. James Wallace was appointed Chief Engineer to the Sydney Railway Company, arriving in Sydney in July. After inspecting the works he recommended the directors to stop them at once, and to begin afresh at the Sydney end of the line, under new management; this recommendation was acted upon by the board. On July 17 Mr. Cowper retired from the Managing Directorship of the company and succeeded Mr. Charles Kemp as President, Mr. Wallace being appointed to a seat at the Board of Directors, to advise but not to vote. On July 29 the contractor for the works in progress was asked to give up his contract, a fair value being allowed for the work done, and Mr. William Randle was appointed Manager of Works, it being intended to carry out the work on the small sub-contract system, the company to supply the necessary plant. On August 7 an agreement was made between Mr. Randle and the company, under which the former undertook to carry out certain earthworks at the Sydney end, at agreed prices, including all plant and tools. There were as yet no earth-wagons, nor any rails; in fact, the first rails subsequently used were of hardwood, plated with flat bar-iron. On August 10 the first party of excavators under the new management was set to work at Redfern, at day wages. On August 31 the Government decided to bring out 500 trained railroad workmen from England, the available local labor being scarce and inferior. At the same time the Government agreed to advance funds to enable the company to proceed vigorously with the works. At this time the Hobson's Bay Railway Company was formed in Melbourne.

On October 14 Mr. E. Deas Thompson, the Colonial Secretary, made a personal inspection of the works, and on November 15 a loan of £100,000 from the Savings Bank to the company was authorized by the Government. On revision of the plans it was found that barely sufficient land had been purchased for a single line of railroad, and as a double line had been decided on it became necessary to secure additional width throughout the entire length of the line. On November 23 a letter was received by the Directors from the Government offering to provide funds at the rate of £3 for every £2 of capital raised on shares, on condition, however, that the Government should appoint two directors, one of whom was to be President of the Board. On the same date there was an official demand on the part of the contractor for an increase in price from 1s. 6d. to 2s. 2d. per cubic yard for earthwork, on account of increasing labor difficulties. On April 2, 1853, the laborers working as excavators struck work for an increase of wages to 10s. per day. Very little progress was made with the works during April and May. Early in June the Hunter River Railway Company was formed to open up the Hunter River district, Mr. Charles Cowper being one of the directors. The line projected was to connect Newcastle and Maitland. On October 3, Mr. Wallace, the Chief Engineer of the Sydney Railway Company, was appointed Consulting Engineer to the Hunter River Railway Company. On August 25 200 railroad men arrived in Sydney from England, engaged and shipped for the Government. Seventy ordnance tents were supplied for their accommodation, and they were placed temporarily in the charge of the Manager of Works. A second consignment of men arrived on November 11 and a third and final consignment on December 10. Many of the newly-arrived laborers were Welshmen, and objected to working under other than Welsh foremen, and as many of them could not speak English there was a good deal of trouble in setting them to work. On August 26 the Government notified the company of the appointment of Mr. Merewether as President of the Railway Board, and at the first meeting held under this new arrangement, on August 29, Mr. Cowper resigned his position as a director.

Mr. Wallace, on taking charge as Chief Engineer, strongly urged the Sydney Railway Board to adopt the standard English gage of 4 ft. 8½ in. instead of the 5-ft. 3-in. gage decided on prior to his arrival. Mr. Wallace's reason for advising the alteration was that for the standard gage there would be no difficulty in obtaining an ample supply of rolling stock at short notice; whereas for the 5-ft. 3-in. gage there was a very limited supply, there being only a small number of manufacturers of rolling stock of this gage. At that time (July, 1852) there had not been a yard of permanent-way laid in any of the Australian Colonies, nor had any rails been imported.

The directors approved of the recommendation, which was adopted by the Government, and the 4-ft. 8½-in. gage thus became the standard for New South Wales railroads. An official communication was at once forwarded to the Government of Victoria giving particulars of the change decided upon, and asking that Government also to adopt the alteration; but, although railroad construction had not been begun in Victoria, the authorities decided to adhere to the 5-ft. 3-in. gage; hence arose the break of gage between New South Wales and Victoria.

On March 22, 1854, the first consignment of permanent rails arrived in Sydney. On May 12 the directors called for independent test tenders for fencing, and on May 29 the lowest rate tendered was 18s. per rod (16½ ft.), being 3s. per rod higher than Mr. Randle's scheduled rate. There was no contract under seal for the Sydney-Paramatta line, the rates of payment for the various works being agreed upon from time to time, as the state of the labor market rendered revision of prices necessary. Mr. Randle was, in fact, the acting contractor for the line. There was no possibility of competition, as the only railroad men in the country were those imported by the Government, supplemented from time to time by a few skilled artisans or laborers, attracted by the gold-diggings and the chance of employment on the only railroad works then in progress.

During the years 1851-1857, many changes took place in the cost of labor and materials, and the following are some particulars relating thereto; the working-time for all classes of labor was fixed at 60 hours per week.

Rates of Wages.			
In the United States in 1851:			
Laborers on public works	3s.	to 4s. 6d.	Per day of 10 hours.
Carpenters, bricklayers and masons	6s. 3d.	to 9s. 4d.	
In England in 1851:			
Excavators	3s.	to 3s. 6d.	
Masons, bricklayers and carpenters	5s.	to 5s. 6d.	
Smiths	4s. 6d.	to 5s.	
Horse, cart and driver	7s.		
In Sydney:			
	Sept., 1852.	Sept., 1854.	
Laborers	5s. to 6s.	15s.	
Masons and bricklayers	8s. to 8s. 6d.	20s. to 27s.	
Carpenters	7s. to 9s.	15s. 6d.	
Smiths	9s. to 10s.	15s. 6d.	
	April, 1855.	August, 1855.	
Masons	16s. to 21s.	16s. 8d.	
Bricklayers	20s.	18s.	
Carpenters	10s. to 11s.	10s.	

On August 10, 1854, an estimate of the cost of the Hunter River line was submitted by the Consulting Engineer, Mr. Wallace. The total cost was estimated at £310,000 for a double line 18¼ miles long. The consideration of the estimate was postponed, and, meantime, the Resident Engineer was sent to Newcastle to erect huts for the expected railroad men. On October 5, tenders were received by the Hunter River Railway Company for the construction of the first section of the line between Newcastle and Hexham; the lowest was that of Mr. William Wright, which was accepted. On November 16 the Chief Engineer's estimates for the construction of the line were adopted. A Government Railways Bill was passed on December 2. On February 20, 1855, the two first locomotive-engines were received from the shops of Messrs. Stephenson & Sons, of Newcastle-upon-Tyne, and on March 29 No. 1 engine made its trial trip.

On the Sydney-Paramatta Railway approaching completion, it was agreed that Mr. Randle should undertake the working of the traffic, receiving 55 per cent. of the gross revenue on condition that he maintained the works and rolling-stock in good order, wear and tear being allowed. On August 18, 1855, the railroad was officially opened. The first train consisted of No. 1 engine, three first-class carriages and a van. Several special trains were run during the month of August, but the line was not opened for public traffic, pending completion of the sidings and stations, until September 26. Up to Sept. 1, 1856, the line was worked by four engines, Nos. 1 and 2 from Messrs. Stephenson's, and Nos. 3 and 4 from Messrs. Hawthorn's works, Newcastle-upon-Tyne. The following are particulars of No. 1 engine: Inside cylinders, 16 in. diameter by 24 in. stroke; six wheels; leading and driving wheels, coupled 5 ft. 6 in. diameter; trailing wheels, 3 ft. 9 in. diameter; working boiler-pressure, 110 to 120 lbs. per sq. in.; six-wheel tender; wheels, 3 ft. 9 in. diameter; tank capacity, 2,000 gallons; weight of engine, empty, 20 tons; with fuel and 500 gallons of water, 22.85 tons; weight of tender, empty, 9½ tons; with fuel and water, 20.55 tons; gross weight of engine and tender, 43.40 tons; hauling capacity on the level, 372 tons; on a 1-in-66 gradient, 85 tons; cost, shipped, £2,725; freight and charges, £600; landing and erecting, £350; total cost, £3,675.

The Prussian Minister of Public Works, in issuing orders for a thorough inspection of all passenger cars during the months of July and August, calls especial attention to enforcing cleanliness, outside and in, and especially in the water-closets; and to seeing that where trains are made up that the cars are well ventilated and cooled off, if necessary by wetting down the roofs. Passengers early for their train in Jersey City (or elsewhere) who have been baked in a parlor car until the train started, will approve this latter suggestion.





# GENERAL NEWS SECTION

## NOTES.

The Grand Trunk has joined the Central Passenger Mileage Bureau.

The forces at the shops of the Pennsylvania Railroad have this month been increased about 20 per cent.

The Southern Railway has put the block system in effect on the line between Knoxville and Chattanooga, 111 miles. Fifty-four additional operators have been employed.

The business of the 18-hour Pennsylvania Special, between New York and Chicago, is so good that the company has put on a fourth car. Over those portions of the line where a dining-car is run this makes a five-car train.

The Enterprise Transportation Co., running steamboats between New York and Fall River, has bought from the Eastern Steamship Co. the freight and passenger steamer "Kennebec" and the new vessel will run regularly after September 21, alternating with the "Frank Jones."

Indiana papers report that the question of the legality of free passes and of the right of the State Railroad Commission to require reports of passes is to be tested in that state by a suit in the courts, which is to be prosecuted by the Pennsylvania Company, acting in behalf of itself and the other roads.

The Consolidated (electric) Railway Co., of Connecticut, repeating the action of last year, has set aside two funds of \$500 each to be divided among the conductors and motormen at the end of the year, according to their records, the intention being to give premiums to all those having clear records; or, if there are none whose records are clear, to those standing highest in the scale.

### A New Kind of "Cheek."

The English police recently had to deal with a beneficiary of unlawful discrimination. John Henry Richardson, a clerk out of work, for some time past has traveled about England without paying fares. Posing as a locomotive inspector, he would board an engine, issue directions to the driver, direct his operations, and in general comport himself with the semblance of real authority. The drivers, apparently, made no demands as to his credentials, for Richardson was wise, kind and authoritative. He proceeded unmolested on his footplate career over the North-Western system. On the strength of his bogus inspectorship, he borrowed money from stationmasters and barmaids, a gold watch and silk handkerchief were entrusted to him by a young lady of Manchester, and from a locomotive foreman he accepted the loan of a mackintosh, which he afterwards pawned for half a sovereign.

### Disastrous Collision at Paoli.

In a rear collision of eastbound passenger trains at Paoli, Pa., on the main line of the Pennsylvania Railroad, 19 miles west of Philadelphia, last Monday afternoon, four employees of the mechanical department of the road, and a guest, five in all, were killed and 13 persons were injured, most of them passengers. The killed were in the general manager's private car, which had just been attached to the rear of a local passenger train for a short trial trip. This train, standing at the station on track No. 1, preparatory to beginning its trip, was run into at the rear by an express train. It is said that the express was running at moderate speed; but the private car was crushed for 10 ft. at its rear end, and it was forced half way through the day car ahead of it, which was empty. The express had run through a cross-over track from track No. 2 to track No. 1. Only a short distance back, in the same yard, the express had crossed from track No. 1 to track No. 2, and appears to have over-run the signal of the second cross-over, set at stop to protect the local train while it was crossing from track No. 4 to track No. 1. Engineman Broomall, of the express, is mentioned in the newspaper reports as "a new man at the throttle."

### A British Railway's Strange Predicament.

The serious decline of late years in the dividends of the North London Railway has started an influential body of its stockholders agitating for the absorption of the North London Railway by the London & North Western, or, alternatively, that the North London should be leased at a fixed rental. Formerly the North London paid a regular 7½ per cent. dividend, and the ordinary stock ranged in price from 200 to 230. Now, by drawing upon reserve, it is only possible to pay a 5 per cent. dividend, while the ordinary stock is quoted at about 120. This serious decline is attributed to electric railway and tramway competition. At the recent half-yearly

meeting, the chairman said it was practically impossible for North London to attempt to meet this competition by the electrification of its lines, until electric traction was first introduced on the suburban lines of the London & North Western and other companies. Thus the North London is in a peculiarly unfortunate position. Both the cause of its misfortunes and the remedy are officially admitted, but nothing can be done until other railroads permit its directors to do so. Thus, failing electrification, the suggestion of the private stockholders that the North Western should take over the line, seems the only alternative remedy to what is to them a really serious state of affairs. Of course, to the North Western, which owns £1,328,730 North London ordinary stock out of a total of £2,034,400, a local line such as the North London Railway is useful in other ways than as mere dividend earner; but this is not the case with the private stockholders. Of the ten directors of the North London, six, including the chairman, are nominees of the North Western.

### Rolling-Lift Bridges.

It is interesting to note the amount of substitution of rolling-lift bridges for swing bridges, due to the fact that for an increase in the number of tracks the swing bridge must be taken out and scrapped or sold, while the lift system is elastic and single or double-track lifts can be added:

Some of the notable Scherzer rolling lift bridges that have been built in place of center-pier swing bridges are:

- 4-track, Metropolitan Elevated, Chicago.
- 8-track, Pennsylvania and other lines, Chicago.
- 2-track, Chicago Terminal Transfer, Chicago.
- 1-track, C. C. & St. Louis, Cleveland.
- 2-track, L. S. & M. S., Cleveland.
- 2-track, N. & S. S., Cleveland.
- 2-track, B. & O., Cleveland.
- 2-track, C. R. R. of N. J., Newark Bay.
- 2-track, C. R. R. of N. J., Newark Bay.
- 2-track, Boston, Rev. B. & L.
- 6-track, South Terminal, Boston.
- 4-track, N. Y., N. H. & H., Bridgeport.
- 2-track, S. E. & C., Swale River, England.
- 4-track, N. Y., N. H. & H., Cos Cob, Conn.
- 4-track, N. Y., N. H. & H., Westport, Conn.
- 4-track, N. Y., N. H. & H., Stratford, Conn.
- 4-track, N. Y., N. H. & H., Atlantic, Mass.
- 2-track, N. Y., N. H. & H., Lyme, Conn.
- 6-track, N. Y., N. H. & H., Bronx and Hutchinson Rivers, New York City.
- 2-track, F. & R., Suir River, Ireland.
- 3-track, Dutch State Rys., Holland.
- 2-track, B. A. Gt. So., Riachuelo River, Buenos Aires.

The more than forty Scherzer bridges already built for electric roads are nearly all double-track and multiple track structures.

### Baltimore & Ohio Shop Improvements.

The Baltimore & Ohio has given contracts for extensive improvements at Riverside (Baltimore), to Edward Brady & Son, of Baltimore, to cost about \$500,000. The work includes the construction of two 26-stall roundhouses, one to be used for passenger and the other for freight engines; two 80-ft turntables and pits; also a 540-ton coal tippie and two depressed ash pits, 155 ft. long; an oil house 30 x 55 ft., and a two-story machine shop and power building 100 x 250 ft. In the latter building will be located the stores department, carpenter shop, tin shop, machine shop, blacksmith shop, engine and boiler room and part of the second floor will be used by the general yard offices. All the buildings are to be built of concrete, brick and steel, heated throughout with steam and equipped with the latest and best machinery, and everything will be of the most modern make.

### President Diaz's Review of Mexican Railroads.

In his recent message to the National Congress of Mexico, President Diaz gave a review of the progress of railroad construction in that country as follows:

"The additions to the railroad system of the Republic during the past six months have aggregated 236 kilometers (146 miles), the largest extensions being those of the railroad from Carpio to Temosachic, completed, 87 kilometers; from Chihuahua to Ojinaga, 60 kilometers; from Linares to the San Jose mining district, 35 kilometers, and the Atlamajac line, 20 kilometers. The total length of the railroads of Mexico is now 16,866 kilometers (10,456 miles). The Pan-American has continued its work and has laid twenty kilometers of track. On the railroad that is being built by the Mexican Central from Guadalajara to Manzanillo, construction work was recently resumed. On the National Tehuantepec the work of substituting heavy for light rails has continued and the new bridge at Santa Lucrecia has been completed. There will be submitted to the National Congress for its sanction a contract entered into for the construction of a railroad uniting the states of Sonora, Sinaloa, Jalisco and the territory of Tepic with the other railroads of the country."

### The Trump Concrete Measuring and Mixing Machine.

The accompanying illustrations clearly show the principle and operation of the Trump concrete measuring and mixing machine made by the Link Belt Engineering Company, Philadelphia, Pa. The machine consists essentially of a horizontal revolving table, on which the material to be measured rests, and a stationary knife set just above the table and pivoted on a vertical shaft just outside of its circumference. This knife is adjusted so as to extend the proper distance into the material on the table, and at each revolution of the table it peels off a certain amount of the material which falls over the table edge and into the chute, as shown in Fig. 1. As the material is peeled off by the knife, it is replenished, so that the pile on a certain part of the table is filled in to approximately the same shape and size by the time it has re-

crete, etc., the machines are made with two or more tables, set one above the other, and mounted on the same spindle so that they revolve together, each table having its own storage cylinder above it, and the cylinders placed one within the other as shown in Fig. 4. Each table is provided with a knife and with its own adjusting mechanism, thus the percentage of each material in a mixture can be varied at will. As the materials flow together constantly and regularly in small streams as they drop down the common chute, each infinitesimal amount of one ingredient is accompanied by the proper amounts of the other ingredients, and the particles become intimately mixed.

In feeding materials to the storage cylinders of these machines a conveyor can be employed; they can be delivered by gravity from a storage bin, or they can be shoveled; and it is only necessary

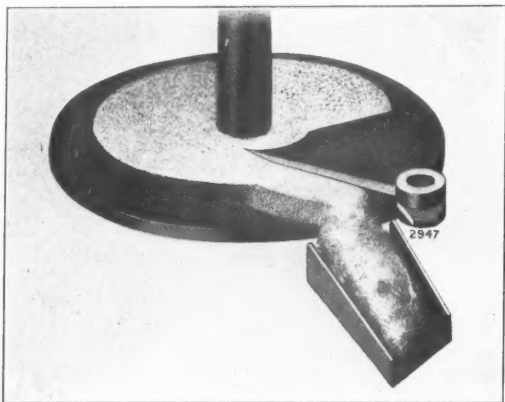


Fig. 1.

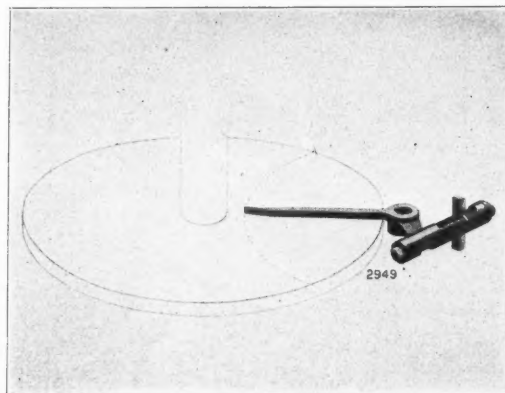


Fig. 3.

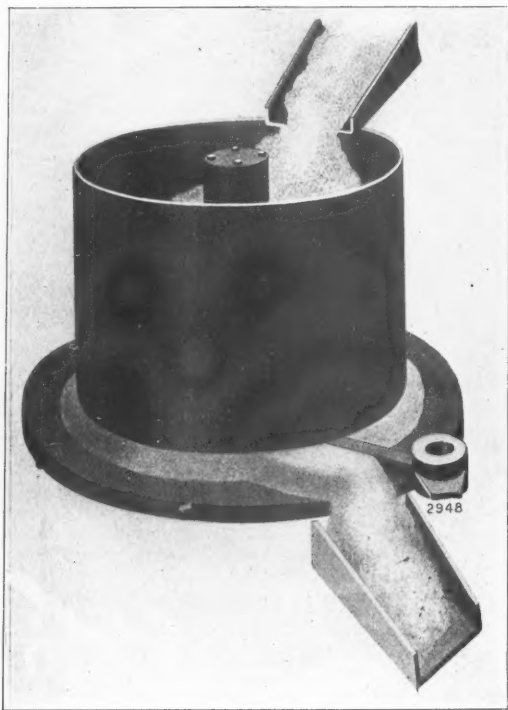


Fig. 2.

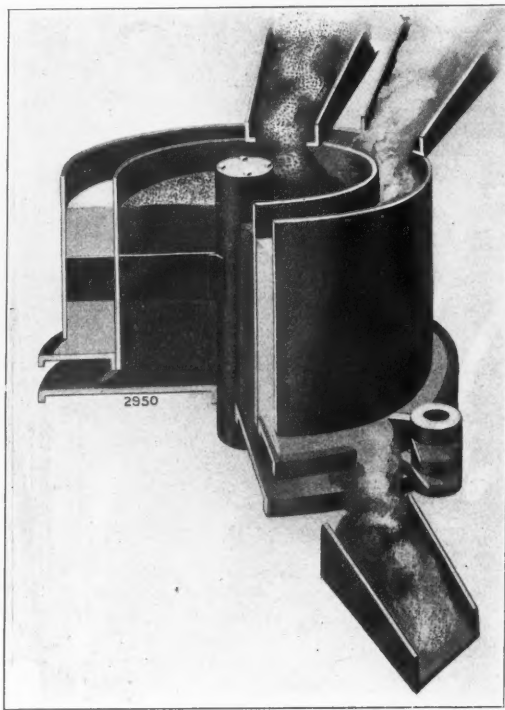


Fig. 4.

### The Trump Concrete Measuring and Mixing Machine.

involved so as to be again presented to the knife. This is accomplished, as shown in Fig. 2, by placing a bottomless storage cylinder, somewhat smaller in diameter than the table and revolving with it, with its lower edge a short distance above the table so that the material flows out from under the edge of the cylinder and assumes a conical shape. The factors determining the amount measured off are the distance between the bottom of the cylinder and the top of the table, the width of the knife and its depth of cut, and the speed of rotation of the table. The depth of cut of the knife is adjusted by swinging the knife around on its pivot, so that it extends a greater or less distance into the material. This swing is controlled by a screw attached to an arm, cast as part of the knife, and a micrometer scale with pointer shown in Fig. 3 indicates the amount of the movement. Where it is desired to measure off and mix two or more materials, such as in mixing con-

crete, etc., the machines are made with two or more tables, set one above the other, and mounted on the same spindle so that they revolve together, each table having its own storage cylinder above it, and the cylinders placed one within the other as shown in Fig. 4. Each table is provided with a knife and with its own adjusting mechanism, thus the percentage of each material in a mixture can be varied at will. As the materials flow together constantly and regularly in small streams as they drop down the common chute, each infinitesimal amount of one ingredient is accompanied by the proper amounts of the other ingredients, and the particles become intimately mixed.

The tables and storage cylinders are all mounted on and driven by the same center sleeve, which is carried on a dirt-proof step bearing with hard bronze and steel washers and proper oiling device. The lowest table has a bevel gear cast on the under side, and is driven by a pinion mounted on a countershaft. The casings of the machine are made dust-proof to avoid any possibility of leakage or pollution of the air by finely powdered materials, and the whole is mounted on a substantial base, thus making the machine entirely self-contained. The countershaft can be connected

up to an electric motor by direct gearing; or can be driven by means of a belt and pulley.

#### British Railway Employees' Hours of Labor.

The twelfth annual report of the British Board of Trade on railroad employees' hours of labor in the United Kingdom for the year ended July 27 last, records that complaints totalled 47; the total since the passing of the act being 766. This is an increase on the two preceding years, but less than the average since 1893, the number of cases inquired into since the passing of the act being as follows: 1894, 72; 1895, 156; 1896, 97; 1897, 76; 1898, 50; 1899, 46; 1900, 41; 1901, 19; 1902, 123; 1903, 28; 1904, 11; 1905, 47. Only seven signalmen complained of long hours, while the most frequent complaints came from drivers and firemen (15), and from guards and brakemen, also 15.

#### Composite Dining Cars on the North Eastern of England.

The North Eastern Railway has introduced on its express services between Leeds and Scarborough, and York and Newcastle-on-

trains. The size of these blades, and lights to be used in connection with them to be approved by this board.

2. That a stationary "slow" sign be placed at a proper point in a manner to make it conspicuous, and so that it can be seen and read by motormen of all southbound trains.

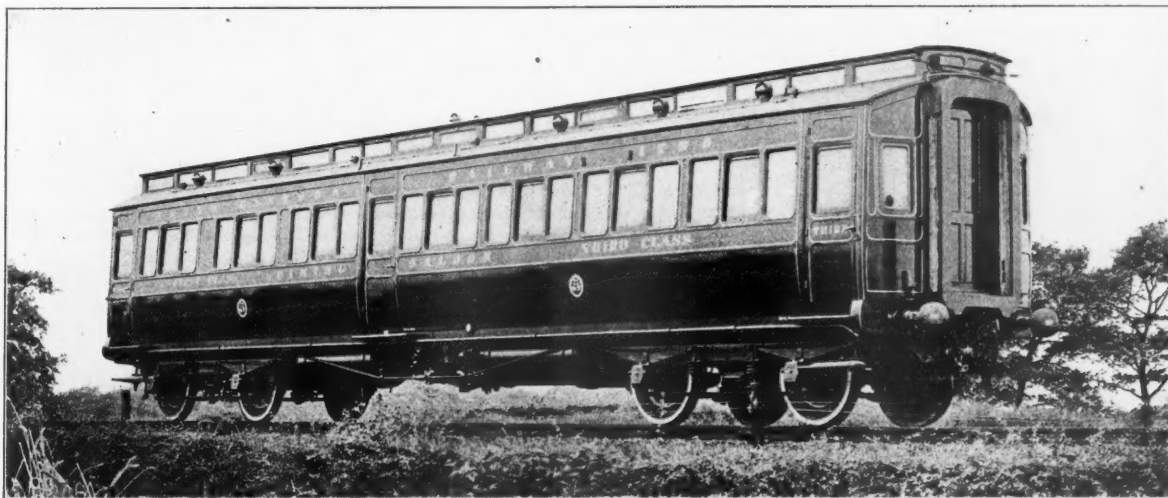
3. That all southbound trains on the local track come to a full stop before reaching the above mentioned semaphore.

4. That a rule to the above effect be issued, properly posted, and a copy of it properly delivered to every motorman, conductor, trainman, and all employees in any manner connected with the operation of the Sixth avenue and Ninth avenue lines.

5. That the above rule be rigidly enforced.

The Commission finds that the towerman was at his post of duty "about one minute before the accident occurred," giving the inference that he left his post of duty with the switch and signals set for a Sixth avenue train. The report says, further:

"We find that this accident was caused by the motorman, Paul Kelley, violating the company's rules in running by a cautionary

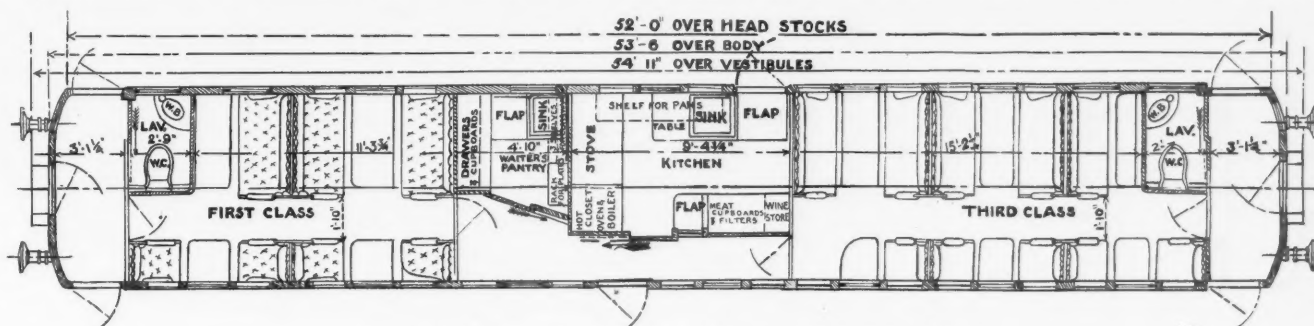


Composite Dining Car—North-Eastern Railway.

Tyne, a number of new composite dining cars, in substitution of the refreshment cars previously used. The first class saloon portion is 14 ft. 2 in. in length, and has seats for 10 passengers. The third class portion, which is 17 ft. 11 in. in length, has a seating accommodation for 20 passengers, and is finished in oak. The

signal without reducing speed, and by running by a signal showing that the switch was set for a Sixth avenue train, he running a Ninth avenue train, one carrying proper signals for that line.

"We also find that Cornelius A. Jackson, the towerman, contributed to the cause of the accident by having the switch and signal set



General Plan of Composite Dining Car—North-Eastern Railway.

kitchen and waiters' pantry are placed in the middle of the car, as shown in the plan, and the first class dining portion is at one end and the third class at the other. The kitchen is fitted with cooking-ranges and all up-to-date appliances for serving dinners or luncheons. The cars are steam-heated throughout and lighted with incandescent gas. The underframe is of the North Eastern Railway standard pattern, with the Buckeye coupler in connection with a Pullman vestibule. These cars weigh 30 tons 7 cwt.

#### Report on Elevated Railroad Disaster.

The New York State Railroad Commission has made a report on the recent accident at Ninth avenue and Fifty-third street, New York City, in which one car of an elevated train fell off the structure to the sidewalk, causing the loss of twelve lives and injuries to forty persons.

The recommendations are:

1. That the two signals at and near the switch-point connecting the Ninth avenue and Sixth avenue southbound tracks be replaced by a double bladed semaphore signal, one of these blades to govern the Ninth avenue trains southbound, the other the Sixth avenue

for a Sixth avenue train, when a Ninth avenue train, displaying proper signals, was approaching the junction."

#### Railroad Education at the University of Chicago.

By co-operation between the University of Chicago and a number of railroad officers, a four-year course in railroad education has been established at the university.

An advisory board composed mostly of railroad men, has been established, with E. W. McKenna, assistant to President Earling, of the Chicago, Milwaukee & St. Paul, as chairman, and Daniel Willard, second vice-president of the Burlington, as vice-chairman. Among those who form the board are: A. C. Bird, A. F. Banks, W. C. Brown, F. A. Delano, J. T. Harahan, J. N. Faithorn, S. M. Felton, W. A. Gardner, S. T. Fulton, J. Kruttschnitt and B. Thomas. These men will shape the courses and also deliver lectures as occasion requires.

An outline published in the newspapers says that the first year's course will be devoted to railroad conditions in the United States, and the second year to freight service, transportation, law and rate regulation. During the third year the following branches will be covered: Passenger service, statistics and geography, signaling and

train service, auditing and finance, and terminals. During the fourth year motive power, car equipment, track, railway development abroad, and the economics of railroad locomotion will be studied.

#### High-Speed Steel for Rail Drilling.

Although the general use of high-speed steel has revolutionized machine shop practice in the past few years, efforts to produce satisfactory twist drills from it have not been fully successful. The Rich flat drill has been produced recently, however, and it is said that it will outwear 10 to 15 twist drills. It is made from a rolled bar of selected air-hardened steel. Suitable lengths are cut and put through a highly refined process, the result of long experiment. They are carefully tempered throughout the entire length, as they are designed to be usable to within 2 in. of the butt. They are then ground and are ready for use. During the process of manufacture frequent tests are made and those showing defect are thrown out.

Some interesting trials are reported which indicate the superior-



Rich Flat Drill Bit and Special Chuck.

ity of air-hardening steel for drilling purposes, and show its remarkable endurance. At one of the Carnegie Steel Company's rail mills, in a set of six Rich flat drills each drilled 1,600 holes, 1 in. in diameter, in 80-lb. steel rails without being reground. That a great deal depends on the proper tempering and refining of air hardening steel in the production of a drill bit, was shown by a test at the Illinois Steel Company's mill, South Chicago, Ill., where the Rich drill was tested with forged flat drills of the same material. It was found that the Rich bit drilled twice as many holes at 50 per cent. greater speed. Another interesting experiment was made on armor plate in the Brooklyn navy yard. The Rich drill bit drilled ten holes in the armor plate turrets of the battleship "Connecticut" 1¼ in. in diameter without re-sharpening, while eight twist drills were used without finishing one hole.

The Rich flat drill requires a special chuck. The jaws, which are adjustable, are arranged to hold the bit true and firm by means of a clamping unit. The end of the bit is supported by an adjustable thrust block within the barrel, which may be changed to compensate for the wearing off of the point in grinding. One important feature which reduces the likelihood of the drill's breaking is the depth of the barrel, which allows the bit to recede into it until only enough is presented to penetrate the work before it.

A special Rich spindle, chuck and drill is made for use on Paulus track drills. The spindle is interchangeable with the older style which accommodated the straight shank twist drill. Paulus drills now in use may therefore easily be supplied with the Rich chuck and drill.

The Buda Foundry & Manufacturing Company, Chicago, is the exclusive selling agent.

#### Circle Electric Trains in London.

Electric trains have started running round the inner circle of the underground railways in London. Though there has been an electric service on the underground since the beginning of July, this service has only been between the east and west ends of the city.

#### No Passenger Cars Next to Engines.

An order just posted in the Pittsburg yards of the Pennsylvania Railroad reads as follows: "In making up passenger trains no coaches or sleeping cars shall be placed next to the locomotive. In all instances a baggage car, whether the car is needed for baggage purposes or not, must be the first car of the train. This rule applies to excursion and regular trains. In the case of a combination baggage and smoking car the baggage end must be first. The only possible deviation from this order is on those divisions where no provision is made for turning trains at the end of a suburban run. This is the only time when an excuse will be accepted.—Pittsburg Leader.

#### Lincoln's Car.

The historic passenger car used by Abraham Lincoln, and which has been standing neglected many years at Omaha, has been sold to Thomas Lowry, of Minneapolis, Minn., President of the Minneapolis, St. Paul & Sault Ste. Marie Ry., and it is said that it is to be pre-

sented to the city of Minneapolis, with a view to having it placed permanently in one of the parks.

#### Y. M. C. A. Lectures on Electricity.

The Railroad Young Men's Christian Association of New York City announces three courses of study for railroad men in electricity as applied to railroads; elementary, intermediate and advanced, and Secretary George A. Warburton, of 361 Madison avenue, has issued a circular giving the list of subjects. The director and principal teacher is Mr. Sidney Aylmer-Small, E.E. The lectures begin October 10 and run to March 13, and will be given mostly on Tuesday and Wednesday evenings. Some of them will be given at the Railroad Men's building, 361 Madison avenue, and some at the Toucey Memorial building, Mott Haven. Trainmen and other railroad employees are invited to join the classes with a view to preparing themselves for efficient service when the steam locomotives shall be superseded by electric locomotives on the lines running into the Grand Central Station. The course of studies is intended to be very thorough, taking in everything from elementary magnetism and batteries to power houses and all the details of motors. The fees are low. The association committee in charge of educational work consists of DeForest Lillis, James C. Irwin and Frank Davidson.

#### Italian Railroads.

Although the Italian railroads passed into the hands of the state on the last day of June, the system of management is as yet far from complete and will probably only come into full working order at the end of this year, until which time the old order of the former companies will more or less remain in force.

The central direction will be established in Rome. The departmental offices will be at Turin, Milan, Rome, Genoa, Naples, Florence, Venice and Palermo. At Turin and Milan will be the two most important departments, each numbering some 15,000 employees; the remaining departments will consist of some 12,000 employees, with the exception of Palermo, which will number about 6,000, all that are required for the Sicilian lines.

The main lines of Italian railroads will thus in the future be divided into eight departments—Turin, Milan, Rome, Genoa, Naples, Florence, Venice and Sicily—in the place of their former division into three companies—the Mediterranean, Adriatic and the Sicilian. These state departments will control some 11,000 kilometers of railroad and about 96,000 employees.

There will remain in the hands of private companies some 2,000 kilometers of secondary lines, and in the hands of the Adriatic Company 2,000 kilometers of the old southern lines, its own former property. It is more than likely that the Government is actuated by a desire to keep the Adriatic Company in existence, even in a diminished form. If it should find the state management of the railroads an impossible enterprise there will then be at least one already organized company with whom it may possibly treat for relief from some portion of its charge.—London Times.

#### Manufacturing and Business.

Mr. August Ziesing, Western Manager of the American Bridge Co., of New Jersey, has been elected President, succeeding Mr. Alfred J. Major, who resigned on account of ill health.

Mr. Frank H. Alfred, M. Am. Soc. C. E., heretofore Chief Engineer of the Pere Marquette R. R., has been appointed General Manager of the Canadian White Company, Ltd., with headquarters at Montreal, Que.

The Union Switch & Signal Co. has declared the usual quarterly dividend of 2½ per cent. on the preferred and 2 per cent. on the common stock of the company, payable by check October 10th to holders of record Oct. 1, 1905.

The Westinghouse Machine Company state that during the past month orders have been received for 51 Roney mechanical stokers, ranging in size from 54 in. x 20 grate to 132 in. x 26 grate. The largest order was that of the Pennsylvania Railroad for six 132 in. x 26 grate stokers and five 100 in. x 20 grate stokers.

Mr. R. R. Shuman has resigned his position of Western Editor of the *Iron Age* to engage in the business of designing and writing trade paper advertising, at 1270 Old Colony Building, Chicago. Prior to his connection with the *Iron Age* Mr. Shuman had twelve years of experience in the advertising business, having been successively advertising manager for the Deering Harvester Co., Carson, Pirie, Scott & Co., and Jos. T. Ryerson & Son, all of Chicago.

Mr. Daniel Royse has resigned as Editor of the *Street Railway Review*, Chicago, to take effect October 14th. Mr. Royse joined the *Street Railway Review* staff in December, 1896, and since February, 1901, has served as Managing Editor of the journals owned by the Kenfield Publishing Company, including for a time *Steam Engineering*, *Street Railway Review*, and *Brick*. Mr. Lawrence E. Gould, who for some time has been Associate Editor, will succeed Mr. Royse as Editor.

## MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

## Iowa Railway Club.

At the regular monthly meeting of this club to be held in Des Moines, October 9, a paper on "Making a Time Card" will be read by W. H. Giben, Superintendent of the Des Moines Valley division of the Rock Island. The secretary reports the present membership of the club as being larger than at any previous time since its organization.

## ELECTIONS AND APPOINTMENTS.

*Ann Arbor.*—F. A. Durban, President of the Detroit, Toledo & Iron-ton, has been also elected President of the Ann Arbor, succeeding Joseph Ramsey, Jr., resigned.

*Atchison, Topeka & Santa Fe.*—J. H. Keefe, Chief Clerk to the General Manager, has been appointed Assistant to the Second Vice-President and General Manager, with headquarters at Galveston, Tex.

*Chicago, Milwaukee & St. Paul.*—E. W. McKenna, Assistant to the President, has been elected Second Vice-President, with office at Chicago.

*Chicago, Rock Island & Pacific.*—H. S. Ray, General Eastern Passenger Agent, has been appointed Assistant General Passenger Agent, with headquarters at St. Louis.

*Cincinnati, Hamilton & Dayton.*—Eugene Zimmerman, President, has resigned.

*Cincinnati, New Orleans & Texas Pacific.*—M. W. Maguire, Superintendent of the Chattanooga division, has resigned. H. M. Waite, Superintendent of the Cincinnati division, succeeds Mr. Maguire. C. E. Rickey, Superintendent of Car Service of this road and of the Alabama Great Southern, succeeds Mr. Waite. The title of Superintendent of Car Service is changed to Superintendent of Transportation, to which office R. E. Boswell is appointed. These appointments take effect October 1.

*New York, New Haven & Hartford.*—The office of F. E. Byrnes, Assistant to the President, has been transferred from Boston to New Haven. F. S. Curtis, Second Vice-President, is relieved of all connection with construction and maintenance and his office is transferred to Boston, where he will represent the President with full authority. E. H. McHenry, Fourth Vice-President, will take charge of the construction and maintenance work hitherto done by Mr. Curtis. Calvert Townley, First Vice-President of the Consolidated (Electric) Railway, will take charge of matters pertaining to the Consolidated Company, formerly within the jurisdiction of Mr. McHenry.

*Pere Marquette.*—F. H. Alfred, Chief Engineer, has resigned.

*Seaboard Air Line.*—W. W. Gwathmey, Jr., Chief Engineer, has resigned. W. L. Seddon, Assistant Engineer, has been appointed Chief Engineer, succeeding Mr. Gwathmey.

*Texarkana & Fort Smith.*—C. E. Swindell, General Passenger and Ticket Agent, has resigned. S. G. Hopkins, City Ticket Agent at Texarkana, Tex., succeeds Mr. Swindell.

*Wabash-Pittsburg Terminal.*—See Wheeling & Lake Erie.

*Wheeling & Lake Erie.*—R. Blickensderfer, General Manager of this road and of the Wabash-Pittsburg Terminal, has resigned, and will become Consulting Engineer for both companies. The change was made at his own request. H. W. McMasters, Superintendent of both roads, has been appointed General Superintendent.

## LOCOMOTIVE BUILDING.

The Erie is reported as in the market for a large number of locomotives.

The Louisville & Nashville will build about 12 locomotives at its own shops.

The Atchison, Topeka & Santa Fe will build 10 locomotives at its own shops.

The Toledo & Western has ordered one simple locomotive, which will weigh 50 tons and have cylinders 16 in. x 24 in.

## CAR BUILDING.

The Brooklyn Rapid Transit has asked bids on 150 cars.

The Grand Trunk, it is reported, will order at once about 2,000 freight cars.

The Chicago, Milwaukee & St. Paul will build 19 baggage cars at its own shops.

The Central New England has ordered 10 cabooses from the Wason Manufacturing Co.

The New York, New Haven & Hartford has ordered 2,000 box cars from the Standard Steel Car Co.

The Chicago, Milwaukee & St. Paul, it is reported, will build 1,000 freight cars at its Milwaukee shops.

The Philadelphia Rapid Transit is reported to have ordered 40 steel cars from the Pressed Steel Car Co.

Street's Western Stable Car Line (Chicago), it is reported, will shortly be in the market for horse cars.

The Mobile & Ohio has ordered 100 Rodger ballast cars and 100 hopper cars from the American Car & Foundry Co.

The Duluth, South Shore & Atlantic has ordered 200 box cars and 100 flat cars from the American Car & Foundry Co.

The New Orleans Great Northern has ordered 25 Hart convertible cars from the Rodger Ballast Car Co. for October delivery.

The Central of New Jersey, it is reported, is asking bids on 1,000 box cars, 1,000 coal cars, 1,000 wood gondolas and 50 stock cars.

The Fourche River Valley & Indian Territory, it is reported, will shortly place orders for both freight and passenger equipment.

The Des Moines, Iowa Falls & Northern has ordered two 36-ft. Hart convertible cars of 80,000 lbs. capacity from the Rodger Ballast Car Co.

The Canadian Pacific is building 25 parlor, sleeping and dining cars, 90 passenger coaches and 3,000 freight cars at its Angus, Montreal, shops.

The South Bend & Southern Michigan (Electric) has ordered 10 cars from the St. Louis Car Co., part of which are to be delivered this fall and the rest in the spring.

The Chicago & Alton, as reported in our issue of September 22, has ordered four baggage, three passenger and baggage and three passenger and mail cars from the Pullman Co.

The Darien & Western has ordered 30 flat cars of 60,000 lbs. capacity from the American Car & Foundry Co. These cars will measure 36 ft. over all and the bodies and underframes will be of wood.

The Mexican Car & Foundry Company has orders for eight coaches from the Oaxaca & Ejutla, 10 flat cars from Durango Central (Mexico), one private car from Tehautepec National, 10 freight cars from the Mexican Central, 175 coal cars from the Mexican International, 50 mining and six box cars from the Cordoba & Huatusco, and 10 box and 25 narrow-gage cars from the National of Mexico.

The Chicago & Southern Traction Co. has ordered 66 passenger cars and one baggage car from the St. Louis Car Co., for delivery Dec. 20 and May 1. The passenger cars will weigh 57,000 lbs., and measure 51 ft. long over all. The special equipment will include: St. Louis Car Co.'s axles, bolsters, brake-beams, brake-shoes, brasses, couplers, seats and trucks, National Electric Co.'s air-brakes, Hartshorn curtain fixtures, Pantasote curtain material, Hastings heating system and Railway Steel Spring Co.'s springs.

The Pennsylvania, it is reported, has ordered upwards of 15,000 cars. Of these, 500 are hopper cars, 10,000 are gondolas, 3,400 are box and 1,100 are stock cars. They are all to be of 100,000 lbs. capacity. The order is distributed among the following makers: The American Car & Foundry Co., the Pressed Steel Car Co. and the Standard Steel Car Co. It is also reported that the Pressed Steel Car Co. will make 800 steel underframes, for which the Middletown Car Works will make 300 bodies and the Western Steel Car & Foundry Co. will make 500 bodies.

The Toledo & Western has ordered one coal dump car of 80,000 lbs. capacity from the National Coal Dump Car Co., two stock cars of 50,000 lbs. capacity from the W. A. Zelnicker Car Co., and is building one stock car of 50,000 lbs. capacity and three gondola cars of 60,000 lbs. capacity at its company shops. Also ordered 10 Hart convertible gondola cars of 80,000 lbs. capacity from the Rodger Ballast Car Co. to be built by the American Car & Foundry Co. These cars will weigh 35,200 lbs. and measure 34 ft. long over all. The special equipment includes: Westinghouse air-brakes, Climax couplers, and American Car & Foundry Co.'s trucks and wheels.

## BRIDGE BUILDING.

DAYTON, OHIO.—Plans are being made by City Engineer F. M. Turner, and bids will be asked probably the latter part of next month by the Board of County Commissioners for building a combined street railroad bridge to consist of a 200-ft. span steel structure with concrete abutments, to cost about \$300,000.

HURDMAN'S BRIDGE, ONT.—The County Council has decided to build a steel and concrete bridge here to cost \$15,000.

**KINGSVILLE, TEX.**—The St. Louis, Brownsville & Mexico will build a new bridge over the Arroyo Colorado.

**MCKEESPORT, PA.**—A combined highway and electric railroad bridge is to be built over the Youghiogheny river at Thirteenth avenue. Former Mayor Robert R. Caruthers is said to be interested.

**MIDLAND, S. DAK.**—Bids are wanted October 6 by the County Commissioners for building a bridge over Bad river. M. P. Kennedy is County Auditor, Ft. Pierre.

**MILWAUKEE, WIS.**—The Council has passed a resolution to submit to the voters the question of issuing \$200,000 of bonds for building a new bridge on East Water street.

**PERU, IND.**—Bids are wanted by the County Commissioners, October 2, for some bridge work in Miami County. C. W. Macy is County Auditor.

**RICHMOND, IND.**—The County Commissioners will soon give contracts for building a number of small bridges in Wayne County.

**SHORT CREEK, ALA.**—The Ensley Southern, on its extension from this place to Parrish, in Walker County, will build two bridges over the Warrior river at a cost of about \$200,000.

**SWISSVALE, PA.**—An ordinance has recently been signed for building two crossings to pass under the Pennsylvania tracks; also for two bridge crossings over the same tracks; to cost about \$180,000.

**WINNIPEG, MAN.**—The Canadian Northern has decided to build a steel combined highway and railroad bridge over the Assiniboine river a few miles west of this place.

#### Other Structures.

**ASH FORK, ARIZ.**—The Atchison, Topeka & Santa Fe will put up a combined hotel and station of brick two stories high, 50 ft. by 460 ft., to cost approximately \$75,000.

**BIRMINGHAM, ALA.**—Plans have been adopted for a new \$1,000,000 passenger station, which the railroads entering this place, with the exception of the Louisville & Nashville, will build in the eastern part of the city. Work is to be started at once.

**BRISTOL, TENN.**—The freight house owned jointly by the Norfolk & Western and the Southern, was destroyed by fire on the 14th inst. Loss about \$50,000.

**FAIRFIELD, ME.**—The Waterville & Fairfield Electric road will build a two story brick car barn at this place.

**GOLDSBORO, N. C.**—Plans are being made by the railroads to build a new passenger station.

**LONDON, ONT.**—The Grand Trunk, it is said, will build a combined station and hotel here at a cost of about \$2,000,000.

**NORWICH, ONT.**—The Grand Trunk will divert its line through this place and build a large station here.

**OGDENSBURG, N. Y.**—The New York Central will put up a brick passenger station, 40 by 100 ft., to cost \$20,000.

**PITTSBURG, KAN.**—The Kansas City Southern shops at this place are to be enlarged to double their capacity. The plans include the building of a large machine shop, a 30-stall roundhouse and the converting of the present machine shop building into a big tank, boiler and blacksmith shop, and a number of other structures.

**PORTLAND, ORE.**—The Northern Pacific, it is said, has bought 23 acres of land north of its terminal, to be used for shops and other purposes.

**SALEM, ILL.**—The Chicago & Eastern Illinois has bought ground at this place as a site for large freight yards. The work includes the building of a roundhouse.

**WATERVILLE, ME.**—The Maine Central, it is said, will build a large extension to its car shops at this place.

#### RAILROAD CONSTRUCTION.

##### New Incorporations, Surveys, Etc.

**ALASKA SHORT LINE.**—Under this name, a company will ask for incorporation in Washington by J. T. Cornforth, formerly of Denver, to build a railroad from Iliamna, on Cook Inlet, northwest to Anvik. The proposed line will be 380 miles long and its highest elevation 960 ft. above sea level, crossing the mountains through the only natural gap which exists.

**ARKANSAS, LOUISIANA & GULF.**—This company, which is planning to build a road from Pine Bluff, Ark., about 125 miles southward, reaching a point in Louisiana, will, it is said, at once begin construction work. P. B. Stewart, President of the Colorado, Title & Trust Co.; E. A. Sunderlin, J. M. Parker, W. A. Otis and others are interested.

**BAY SHORE & PACIFIC.**—Articles of incorporation have been filed by this company in California, with a capital of \$2,000,000, to build a railroad from a point near the southern boundary of San Diego to Pacific Beach and LaJolla, and thence to the northern boundary of San Diego. This line is to be the first portion of the proposed railroad to Imperial and Humor. The directors include: H. T. Richards, C. R. Hammond, William Crouse, S. Connell, I. D. Stewart and H. C. Oatman, of San Diego, and N. H. Rodgers, of Denver.

**BEAUMONT & GREAT NORTHERN.**—A contract has been given by this company to Lamb & Hansen, of San Antonio and Houston, for building the first 20 miles of its proposed road, which is to run from Trinity, Tex., via Livingston to Beaumont. This is said to be a Gould project.

**BRANDON, SASKATCHEWAN & HUDSON'S BAY.**—Grading work has been commenced by Contractor Richards on this new road from the international boundary to Hudson's Bay.

**CANADIAN PACIFIC.**—This company is making surveys for a new line from Austin, Man., west, to eliminate the heavy grades on the existing line between that place and Carberry. The new line will parallel the line of the proposed Grand Trunk Pacific, being only about 150 ft. distant from the proposed route of this road, which passes about eight miles north of Carberry.

Foley Brothers, Larson & Co., who have the contract for double tracking this road between Winnipeg and Fort William, have sublet the following contracts: Two miles at Cross Lake, to John E. Bostrom; two miles at Kilmar, to include a tunnel about 400 ft., to Larson Bros.; three miles between Ostersund and Busteed, to Fred Peterson & Co.

Grading has been begun by Contractor James Cowen on the link that will connect this company's Hudson Bay line with the main line in St. Charles, a few miles from the city of Winnipeg. The new line will run from a point where the Hudson's Bay line intersects the Canadian Pacific through St. James, crossing over the Assiniboine river and running through St. Charles to the Canadian Northern main line, connection being made near Fort Whyto. On the road further west, the construction work is progressing rapidly and grading is finished to Edmonton, N. W. T.

**CENTRAL BRANCH & ST. JOSEPH.**—See Missouri Pacific.

**CENTRAL OF GEORGIA.**—A contract has been given by this company to W. J. Oliver & Co., of Knoxville, Tenn., to build an extension from Greenville to Noonan, Ga., a distance of about 20 miles. Work is to be commenced at once. (September 8, p. 79.)

**CHICAGO & NORTH-WESTERN.**—See Pierre, Rapid City & North-western below.

**CHICAGO, BURLINGTON & QUINCY.**—This company is pushing work on its extension from Centralia, Ill., south to Herrin. The proposed road will run through Woodlawn, Waldronville, Christopher and Plumfield, and is to be ready for operation by December 1 of this year. The company is planning to build an extension from Valier, on this line, north of Christopher, in Franklin County, northwest to St. Louis. The survey from Valier runs in a northwesterly direction through the counties of Franklin, Perry, Washington and St. Clair, a distance of about 70 miles. Connection will be made at Belleville with the St. Louis & O'Fallon, which will be extended to that point. (June 30, p. 215.)

**CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.**—Surveys are being made by this company for a line from Kismet, in Morgan County, Tenn., southwest to South Pittsburg, a distance of about 133 miles, passing through a rich timber and coal district.

**CORDELE, HAWKINSVILLE & NORTHEASTERN.**—Application will be made by a company under this name in Georgia with a capital of \$250,000 for a charter to build a railroad in that state 35 miles long. Surveys have not been made as yet, but the road is proposed to run from Cordele northeast to Hawkinsville, in Pulaski County. Hon. J. Polk Brown, former member of the Railroad Commission of Georgia; P. H. Lovejoy, H. N. Parsons, J. J. Harvard, C. W. Jordan, Jr., and E. J. Henry, of Gainesville, are interested.

**DARIEN & WESTERN.**—This company, which operates 41 miles of road in Georgia, is planning to build an extension from Darien south to Brunswick, a distance of 20 miles.

**DENVER & RIO GRANDE.**—The Durango-Farmington branch of this road has been completed to Aztec, in San Juan County, and has been formally opened. The balance of the road to Farmington, a distance of about 15 miles, will be completed the first of next month and trains will be regularly run by the 15th. The new branch, which is 50 miles long, Durango to Farmington, has been the subject of dispute between the Harriman and Gould interests during the past summer, the former having obtained an injunction to prevent the building of the road. A stay of the injunction having been secured, work is being rushed on the road, with the hope of having regular trains running over the line before the court takes further action.

**ELMIRA, CORNING & WAVERLY (ELECTRIC).**—An officer writes that this company, which was recently granted a charter in New York to build 37 miles of road, will connect the Corning & Painted Post Street Railway with the Elmira Water, Light & Railroad Company's line, and will also connect the latter road with the Waverly, Sayre & Athens Traction Co.; all these properties, with the exception of the Elmira concern, are to be consolidated under the name of the Southern Tier Railway Co. Joseph A. Powers, of Troy, N. Y., is President.

**ERIE.**—An officer writes in regard to new work between Lakewood, N. Y., and Columbus, Pa., that this company is planning to build a new line from Lakewood through Ashville, Watts Flats, Niobe and Lottsville to Columbus, 21.6 miles, of which eight miles, from Lakewood to a point east of Niobe, is to be double track, and from that point to Columbus, 13.6 miles, single track. This line is to be finished in 1906. Contracts for grading are to be let within the next thirty days. The contract for part of the masonry has been given to Smith-McCormick Company, of Easton, Pa. No grading has been done. The curves are light, but some of the grading is heavy. Maximum grades are .2 per cent. eastbound, and .3 per cent. westbound. (Sept. 15, p. 87.)

A contract has been given to the McGinty Contracting Co., of Minerva, Ohio, at about \$50,000, to build a concrete subway at the eastern end of its yards at Randall.

**FORT WORTH & MINERAL WELLS (ELECTRIC).**—A charter has been filed by a company under this name in Texas, with a capital stock of \$250,000, to build an electric railroad from Fort Worth, Tex., to Mineral Wells, a distance of about 50 miles. The board of directors includes: Cicero Smith, D. M. Howard, H. N. Frost, E. J. Warren and Albert Stevenson, all of Mineral Wells.

**GREAT NORTHERN.**—This company has filed a map showing the definite location of the right of way of its proposed extension from Summers, in Flathead County, Mont., east to Holt, thence along the east side of Flathead lake to the northern side of Flathead reservation, a distance of about 60 miles.

Surveys are being made by this company for a line to be built from St. John, N. Dak., to Brandon, Man. In addition, a spur is to be built from the former place to Fish Lake.

See Portland & Seattle.

**GULF, COLORADO & SANTA FE.**—According to reports from Davis, in the Chickasaw Nation, Indian Territory, this road will build a line from that point, east to the coal fields in the Choctaw nation.

**ILLINOIS CENTRAL.**—See Yazoo & Mississippi Valley below.

**INTERSTATE TUNNEL RAILROAD.**—A charter has been granted to a company under this name in the states of New Jersey and New York to operate a tunnel railroad from Jersey City under the North river to the Borough of Manhattan, New York City. Application has been made to the city authorities for a franchise to extend the tunnel from the North river at the foot of Chambers street east to Park Row. John B. McDonald is President of the new company, and S. L. F. Deyo, Chief Engineer. The plans of the company are before the Rapid Transit Commission for their consideration. Further particulars are given in another column.

**KANSAS SOUTHERN & GULF.**—This company, which operates eight miles of road from Blaine, Pottawatomie County, Kan., south to Westmoreland, has obtained a charter to extend its road from the southern terminus south to Alma, in Wabaunsee County, a distance of about 35 miles. O. J. Collmann, Westmoreland, Kan., is General Manager.

**LOUISIANA EAST & WEST.**—This company is reported ready to let contracts for building its proposed line from Bunkie, La., to South Villeplatte, a distance of 20 miles. C. J. Carpenter, Bunkie, is Superintendent.

**MANHATTAN & LONG ISLAND (ELECTRIC).**—Incorporation has been granted to a company under this name in New York, with a capital of \$10,000,000, to build an electric railroad 80 miles long, connecting Long Island City and Northport, L. I. The directors include: Edward Mackey, D. T. Meyer, H. H. Boutell, S. Y. Sauber, F. M. Walter and George E. McArdle, all of New York, and William R. Stockwell, of Yonkers, N. Y.

**MISSOURI, OKLAHOMA & GULF.**—This company, which operates 62 miles of road in Indian Territory, it is said, has completed surveys for an extension of its road from the northern terminus at Wagoner, Ind. T., north for a distance of 70 miles to Afton; construction work is to be commenced at once. (March 31, p. 102.)

**MISSOURI PACIFIC.**—Regarding the improvements which it was recently reported would be made by this company in St. Louis County, Mo., an officer writes denying the report.

Announcement has been made that this company will extend its line from Atchison, Kan., to St. Joseph, Mo. Incorporation papers have been issued to the Central Branch & St. Joseph for this

purpose. Two routes are under consideration, one on the Missouri side of the river and the other on the Kansas side. Surveys have been completed for both, but it has not yet been determined which will be used. The Missouri Pacific has been using the Burlington's tracks since 1880, and its lease, which expired nearly a year ago, has not been renewed. It is also stated that the company has bought a large plot of ground in St. Joseph as a site for terminals.

**MORELIA & TACAMBARO.**—Reports from Guadalajara, Mex., state that the state of Michoacan has agreed to pay a subscription of \$400,000 to this proposed road to build the line from the Mexican Central station at Ira Puato to Tacambaro, in the state of Michoacan. Announcement has also been made that the construction work will be commenced during the present year. The company is being financed by A. J. Peyton & Co., of New York.

**NAPA & LAKEPORT.**—Application has been made by a company under this name in California, with a capital of \$2,000,000, to build a railroad from Lakeport, Cal., southeast to Napa City, a distance of 90 miles, with a branch from the latter place to Monticello. The road will parallel the California Northwestern for most of its distance, and for part of the way it will also parallel the Southern Pacific. Harding & Sargent, of San Francisco, are attorneys for the company.

**NEW YORK, NEW HAVEN & HARTFORD.**—This company has completed surveys for building a cut-off from Yalesville, on the Hartford division, northwest for a distance of eight miles to Plantsville, on the Northampton division. By such a line the freight traffic of the Northampton division could reach the Cedar Hill freight yard and thus the yard in the city would be relieved.

**NORTHERN PACIFIC.**—See Portland & Seattle.

**NORTH MISSISSIPPI & BAY SPRINGS.**—Application has been made in Mississippi to incorporate this company and grant it the rights of an old charter for a railroad from Burnsville, in Tishomingo County, to Warren Mill, between Tishomingo and Itawamba Counties, a distance of about 30 miles. The road will pass through a rich timber territory. At Burnside, connection will be made with the Southern Railway.

**OREGON SHORT LINE.**—See Yellowstone Park below.

**PAULS VALLEY.**—A charter has been granted this company in Oklahoma, with a capital of \$5,000,000, to build a railroad from Ada, Ind. T., southwest to Wichita Falls, Tex. The directors include: J. C. Amendt, Chicago, President; W. M. Freeman, Vice-President; Albert Kennie, Secretary and Treasurer; J. B. Thompson, S. J. Garwin and J. C. Hybarger, of Pauls Valley, and A. P. Williams, John Upshaw and P. J. Stovall, of Wanetta.

**PIERRE & FORT PIERRE BRIDGE-RAILWAY COMPANY.**—Articles of incorporation have been filed in South Dakota by a company under this name, with a capital of \$10,000, to build a railroad three miles long from the western terminus of the lines of the Chicago & North-Western, in the city of Pierre, over the Missouri river to the eastern terminus of the lines of the Pierre, Rapid City & Northwestern, in the town of Fort Pierre. The estimated cost of the work will be \$300,000 a mile. It is also announced that work on the bridge over the river will be commenced at once. The incorporators are: R. W. Stewart, O. H. McCarty, of Huron; Marvin Hughitt, John M. Whitman and J. B. Redfield, all of the Chicago & North-Western.

**PIERRE, RAPID CITY & NORTHWESTERN (C. & N.-W.).**—Under this name, a company has been incorporated in North Dakota by officials of the Chicago & North-Western to build a railroad from Pierre, N. Dak., west through Stanley and Lyman Counties to Rapid City, in Pennington County, a distance of about 160 miles. The company, it is said, has bought the franchises of the old Rapid City, Missouri River & St. Paul, and will at once begin work east of Rapid City. Contracts for the grading work reported let to John Chamberlain and Owens & Loveless.

**PORT ARTHUR & HOUSTON SHORT LINE.**—This company has not as yet decided which route it will follow after crossing the river at Wallisville, Tex., on its proposed road now under construction from Port Arthur to Houston, Tex. Contracts will shortly be let for building 56 miles of road. (April 21, p. 131.)

**PORTLAND & SEATTLE.**—Announcement has been made by the Northern Pacific that this projected road has been bought for the joint account of that company and the Great Northern. It is proposed to at once build the road from Kennewick, Wash., on the Columbia river, opposite Pasco, west along the north bank of the Columbia river to Vancouver, Wash., a distance of about 200 miles. The grading contract has been let and work started; the work includes a tunnel 2,000 ft. long at Cape Horn and bridges over the Columbia and Willamette rivers. When completed, this line will give both roads a much more direct line from the east to Portland and at the mouth of the Columbia river. This will parallel the Oregon Railroad & Navigation Company's line which runs along the south bank of the Columbia river from Wallula west to Portland.

**ROCKVILLE, WESTPORT & NORTHWESTERN.**—This company, which operates about 45 miles of railroad in Ontario from Brockville to Westport, has made a preliminary survey for 100 miles on its proposed extension to Sault Ste. Marie, a distance of about 450 miles. Permanent surveys have been completed for the first 20 miles.

**SEABOARD AIR LINE.**—This company, it is reported, is making surveys to build a line from Jacksonville, Ala., south to Aniston, a distance of 12 miles.

**SIoux FALLS & WESTERN.**—Articles of incorporation have been filed by a company under this name in South Dakota, with a capital of \$10,000,000, to build 210 miles of railroad. The plans of the company include the building of two lines from Sioux Falls, one to Greenwood through the counties of Minnehaha, McCook, Hutchinson, Douglas and Charles Mix, and the other from Sioux Falls through Minnehaha, Lincoln, Yankton and Bonhomme counties to Bonhomme.

**SOUTHERN.**—This company has given a contract to William J. Oliver, of Knoxville, Tenn., at \$1,000,000 to double track its line from Morristown to Knoxville and build a line from Chattanooga, Tenn., southwest to Stevenson, Ala.

**SOUTHERN TRACTION.**—An officer writes that bids for building this proposed road will be let October 15. The route runs from Altoona, Pa., south through South Altoona, Eldorado, Canan Beryl, Duncansville, Newry, Freedom and McKees to Roaring Springs, with a loop starting from a point on the main line at Beryl and running east through Hollidaysburg, and thence west to the main line at Duncansville. The work will be easy, with light grades and curves. It includes one overhead crossing and nine small steel bridges. F. G. Patterson, Pittsburg, Pa., is President, and H. C. Gwin, of Altoona, Pa., Chief Engineer.

**TEXAS, OKLAHOMA & NORTHWESTERN.**—A charter has been granted to a company in Oklahoma under this name, with a capital of \$2,500,000, to build a railroad 450 miles long. The proposed line runs from a point on the boundary line between the Chickasaw nation and Caddo County, in Oklahoma Territory, northwest to a point on the Cimarron river, in Woodward County, traversing the counties of Caddo, Custer, Dewey and Woodward; also an eastern line through the counties of Blaine, Kingfisher and Logan to Guthrie, and a western line through the counties of Roger Mills and Day. Connection will be made with the Lindsay, Washita & Western, giving connection with western Oklahoma, Texas and Kansas for the coal deposits along the latter road. The directors are: A. H. Huston, John Deveraux, Charles Seeley and C. E. Carpenter, of Guthrie, and Henry Knapp, of New York.

**TONOPAH.**—This company, which operates a road from Soda-ville, Nev., on the Carson & Colorado division of the Southern Pacific southeast to Tonopah, a distance of 65 miles, has filed an amendment to its charter, seeking permission to build an extension from Goldfield, to which point it is now building, to Bullfrog, a distance of about 80 miles. Work is to be started at once.

**UNION PACIFIC.**—Plans, it is said, have been completed by this company to double track its main line for a distance of about 70 miles in Wyoming. Surveys are also being made locating a cut-off from South Omaha west to Valley, a distance of about 25 miles.

**VINCENNES, WEST BADEN & LOUISVILLE TRACTION.**—This company has let a contract to a Pennsylvania contractor to build its line from Vincennes, Ind., via Jasper to French Lick at about \$2,000,000. A contract has also been given to a Philadelphia company to build the power works, either at Pittsburg or Otwell, for about \$300,000.

**VIRGINIA ROADS.**—A corporation has been formed, with headquarters at Newport News, Va., for the purpose of building a railroad from that place to Yorktown. The company, which is capitalized at \$300,000, proposes to use gasoline motor cars. W. A. Post, President of the Citizens' Railway, Light & Power Co., is named as President; J. L. Patton, Vice-President; C. M. Graves, Jr., of Norfolk, Secretary, and Arthur Lee, Treasurer.

**WESTERN OHIO (ELECTRIC).**—This company has completed its line from Findlay to Lima, Ohio, giving an indirect electric road from Cincinnati to Cleveland. The route from Cincinnati to Dayton is by the Cincinnati, Dayton & Toledo. (April 7, p. 111.)

**YAZOO & MISSISSIPPI VALLEY (ILL. CENT.).**—An officer writes confirming the report that this company is building a branch line from Philipp, in Tallahatchie County, Miss., north into the Delta country for a distance of 14.66 miles. (See Illinois Central, Sept. 8, p. 79.)

**YELLOWSTONE PARK (OREGON SHORT LINE).**—Under this name, a company has been incorporated to build a railroad from St. Anthony, in Fremont County, Idaho, southeast through the town of Marysville and over the main divide of the Rocky Mountains by way of Rea's pass through the section forming the western boundary of Yellowstone Park, a distance of about 75 miles; also to build a line from a point on the Oregon Short Line at St. Anthony east

for a distance of 20 miles and thence south 50 miles to Victor, in Bingham County. The offices of the company will be at Pocatello, and the incorporators include: W. H. Bancroft, E. Buckingham, P. L. Williams, William Ashton and others, of Salt Lake, and T. J. Duddleson, of Pocatello.

## RAILROAD CORPORATION NEWS.

**BOSTON & MAINE.**—The Connecticut River, which is leased by the Boston & Maine, has purchased the Vermont Valley, 24 miles long, running from Bellows Falls, Vt., south to Brattleboro and controlling the Sullivan County, which runs from Bellows Falls, north to Windsor, 26 miles. This gives the Boston & Maine a continuous line from Springfield, Mass., to Windsor, Vt., except between South Vernon, Vt., and Brattleboro, 13 miles, over which the Boston & Maine has trackage rights on the Central Vermont. From Windsor north to the Passumpsic division at White River Junction, 14 miles, the track of the Central Vermont is used.

**CHICAGO ELECTRIC TRACTION.**—This company has been sold to a syndicate of Indiana capitalists for the equivalent of \$650,000 cash and \$200,000 in stock of the Interurban Electric Co., of Indiana. It is said that through this sale the latter company will obtain a Chicago terminal as soon as its line from Harvey, Ill., to Kankakee is built.

**CHICAGO, INDIANAPOLIS & LOUISVILLE.**—The gross earnings of this company for the year ended June 30 were \$5,609,750, an increase of \$309,127, and net earnings, \$1,979,710, an increase of \$95,256. The total income was \$2,140,142, and the surplus, \$1,104,948. The company paid 4 per cent. dividends on its \$5,000,000 preferred stock and 2½ per cent. on its \$10,500,000 common stock, leaving a balance of \$628,198, a decrease of \$130,664. The operating ratio was 64.7 per cent. This company is controlled by the Louisville & Nashville and the Southern, who acquired 93 per cent. of the common stock and 77 per cent. of the preferred stock in 1902.

**KANSAS CITY, MEXICO & ORIENT OF TEXAS.**—The Panhandle & Gulf, which is the completed portion in Texas of the Kansas City, Mexico & Orient, has filed an amendment to its charter changing its name to the Kansas City, Mexico & Orient of Texas.

**KENTUCKY & TENNESSEE.**—H. C. Barroll & Co., Chicago, are offering at 100 and interest \$650,000 of this company's first-mortgage 6 per cent. serial bonds issued in 1905. The Stearns Salt & Lumber Co. guarantees the principal and interest of these bonds, which are part of an authorized issue of \$850,000. The proposed road is to run from Stearns, Ky., westerly and southwesterly into Tennessee for 60 miles. The bonds are also secured by timber lands, coal mines, mills and other structures owned by the company in Tennessee and Kentucky.

**MANISTIQUE, MARQUETTE & NORTHERN.**—This company, with the car ferry operated in conjunction with it, has been sold under foreclosure proceedings for \$1,250,000 to the Union Trust Co., of Detroit, this price being \$130,000 more than the bonded indebtedness. It is not unlikely that the road will be acquired by the Grand Rapids & Indiana.

**NEW YORK CENTRAL & HUDSON RIVER.**—In the quarter ended September 30 (figures for this year partly estimated), the gross earnings of the entire system east of Buffalo were \$23,281,500 an increase of \$2,266,100 over 1904. Operating expenses increased \$1,848,600, leaving an increase of \$417,500 in net earnings, which were \$7,452,600. The operating ratio for the whole was 67.99 per cent., while the operating ratio on the additional business gained over last year was 81.6 per cent. For the nine months ended September 30, gross earnings were \$62,471,100, an increase of \$4,982,900. Operating expenses increased \$3,010,300, leaving an increase of \$1,972,600 in net earnings, which were \$18,401,400. The operating ratio for the whole was 70.54 per cent., while the ratio on the nearly \$5,000,000 of increased business was 60 per cent. For the nine months, the balance available for dividends was 4.80 per cent., out of which dividends of 3.75 per cent. were paid.

**OREGON SHORT LINE.**—Kinnicutt & Potter, of New York, are offering at 96 and interest \$500,000 4 per cent. refunding gold bonds of 1929. These bonds are a part of an authorized issue of \$100,000,000.

**PANHANDLE & GULF.**—See Kansas City, Mexico & Orient of Texas.

**TEMISKAMING & NORTHERN ONTARIO.**—This company is negotiating in London for the direct issue of \$7,000,000 bonds. Of this amount, \$6,000,000 will be used to refund the original loan from the government and the remaining \$1,000,000 will complete the payment of the floating debt that has been incurred for building the line to its present terminus, which is 100 miles north of New Liskeard.

